The Survey of Professional Engineers 1968

Ministry of Technology
and the Council of Engineering
Institutions

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Studies in Technological Manpower
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London 1970
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Council of Engineering Institutions

Engineers have been organized professionally in separate institutions concerned with a particular engineering specialism, although the need for closer links between the principal institutions had been recognized for a long time. A federal body was formed in 1962 which led to the establishment of the Council of Engineering Institutions under Royal Charter in 1965. The object and aims of the Council are:

'To promote and co-ordinate in the public interest the development of the science, art and practice of engineering, and for that purpose:

(i) to establish, uphold and advance the standards of qualification, competence and conduct of professional engineers;

(ii) to advance the aims and objectives of its members so far as they relate to the advancement of the science, art or practice of engineering;

(iii) to foster relations with the Government, with national and international bodies and with the public; and to co-operate with other bodies at all levels of technical and professional competence, whose objects and purposes may be related to those of the Council;

(iv) to foster co-operation with universities and other educational institutions;

(v) to foster co-operation between its members on matters pertaining to the science, art or practice of engineering.'

The Charter also provides that the style or title of Chartered Engineer and the initials 'C.Eng.' may be used by fully qualified members of professional institutions. The constituent institutions are listed on the page opposite.

Constituent Members

The Royal Aeronautical Society

The Institutions of
Chemical Engineers
Civil Engineers
Electrical Engineers
Electronic and Radio Engineers
Gas Engineers
Mechanical Engineers
Mining Engineers
Mining and Metallurgy
Municipal Engineers
Production Engineers
Structural Engineers

The Institute of
Marine Engineers

The Royal Institution of
Naval Architects

Steering Committee on the Survey of Professional Engineers 1968

Membership

Council of Engineering Institutions
Mr E S Sellers OBE (Chairman)
Professor G A Barnard
Mr B Hildrew
Mr C D Morgan
Mr L Wild

Consultant in charge
Mr C Scarborough

Ministry of Technology
Mrs J G Cox
Mr R G Fall OBE
Mr J R Bowles
Mr K W Haines

Council of Science and Technology Institutes
Mr D A Arnold

Engineers Guild Ltd
Mr J D Sampson

Preface

This report contains the primary results of the second survey of the professional engineer in Britain which was carried out in 1968. As in the case of the 1966 survey, it was a joint operation between the Ministry of Technology and the Council of Engineering Institutions, with the collaboration of the chartered engineering institutions. The planning of the survey and the selection and presentation of the results were undertaken by the Steering Committee on the Survey of Professional Engineers 1968, whose members are listed opposite. The survey was conducted by the Council's consultant, Mr Christopher Scarborough. The Steering Committee is indebted to the institution members for the high level of response achieved.

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Introduction

The engineering profession

National prosperity, in social as well as financial terms, depends upon the efficient use of resources, and technological manpower is as much a resource as money, materials and machinery. Manpower is, however, much less readily measured and much less susceptible to forward planning. In 1966, the Council of Engineering Institutions and the Ministry of Technology decided that more facts were needed about the engineer, his background and his daily work. To remedy this deficiency a survey was undertaken which was aimed at a cross-section of professional engineers. The result of this, *The Survey of Professional Engineers 1966* (Ministry of Technology, HMSO, London 1967) provided the basic information on salary structure, qualifications and deployment within the engineering profession.

The 1966 Survey

A questionnaire was addressed to a sample of 25,000 engineers, approximately 15 per cent of the corporate members (Chartered Engineers) and the graduate members of the constituent institutions of the CEI. Questions covered age, qualifications, employment, income and level of responsibility and evoked a very satisfactory level of response. The main results were published in the following year and further data were contained in *Statistics of Science and Technology 1968.*

Interest was considerable and widespread, for this was the first profile of a profession to be produced on this scale, in the United Kingdom or indeed anywhere outside the USA. The Federation of European National Associations of Engineers (FEANI) recommended that other member states should carry out similar studies. Several countries have now either carried out, or have planned their own surveys.

The 1968 Survey

It was natural that the success of the 1966 Survey should stimulate a demand for a periodic survey of the profession and CEI and Mintech determined that the venture be repeated in 1968, so that it coincided with a compatible survey of scientists mounted by the five major science institutes (now linked in the Council of Science and Technology Institutes) and with the 1968 survey of persons with qualifications in engineering, technology and science and its questionnaire to employers. A two-year interval was not expected to demonstrate many significant trends, nor to offer evidence of the results of national or institution policies. There were, however, some problems raised as a result of the analysis of the 1966 Survey and an opportunity was taken to include some additional questions. As will be seen from the specimen questionnaire, reproduced on pages 49 to 57, the more important of these covered unemployment, in-career training and the area of technology in which the respondent practised.

Comparisons between 1966 and 1968

The presentation of the primary information follows much the same pattern as in the earlier report with some additional diagrams and, where appropriate, columns of comparable data from both surveys. The first part of the report contains the more general information but greater detail is to be found in the tables of the second part.

As might be expected, there has been a small increase in the proportion of younger engineers and a small but significant increase in the proportion of university graduates. The proportion employed in industry and commerce has fallen very slightly, the field of manufacturing industry showing the greatest loss. Over twice as many engineers report that they are engaged in work of a non-engineering nature, although the percentage in the sample so employed is still small.

The 1966 Survey pioneered the question of the levels of engineering responsibility in this country. The survey showed that 59.5 per cent of members considered that they held managerial posts. The data collected in 1968 reveal that this already high proportion has advanced to 62.6 per cent. Furthermore, those in the sample occupying posts in 'top management' had advanced from 11.4 per cent to 12.3 per cent.

Median incomes have risen by 12 per cent in the two years across almost the whole age range, though the rate falls for the over 60's. There has been some narrowing of differentials between the non-graduate sector, approximately two-thirds of the whole and biased towards the older age groups, and the graduate sector. However, the salary level of university graduates remains higher throughout the whole age range.

The questions relating to unemployment show that while 0.4 per cent of the professional engineers who responded were unemployed at the time of the survey, a further 1.1 per cent had been unemployed at some time during the previous twelve months. These were spread fairly evenly through the age groups.

Post-experience training

There is some concern regarding the obsolescence of traditional engineering skills and the likelihood that the older engineer may be suffering in consequence. The need to encourage post-experience training is self-evident: the medical profession could be cited as giving a lead in this direction. Despite the emphasis on this aspect of training, doubts had been expressed that too few engineers took advantage of the courses offered by the universities and other advanced educational establishments or alternatively that many of these courses were unacceptable in duration or content.

The 1968 survey has indicated a rather better position than had been feared. The data show that over one-third of the members who replied to the survey had undertaken some course of training in the previous twelve months. These courses, which included technical, language and business studies, were taken not only by the younger engineers, but also by engineers in mid or late career. It should, however, be remembered that, of the courses taken, both full- and part-time, some 40 per cent were of only one week's duration or less. The total time spent by the profession on course training is still far from adequate.

Profiles of professional engineers and scientists

It has been agreed with the Council of Science and Technology Institutes that reciprocal publication of data on the remuneration of engineers and scientists would be of considerable interest.

The charts and table on pages 26 and 27 showing median incomes by age groups have been prepared jointly by the two bodies to illustrate the similarities and differences between the profiles of professional engineers and scientists.

Part one
Charts and summary tables

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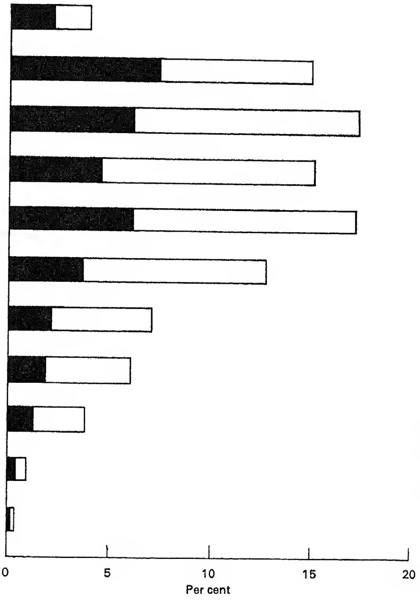
Age distribution of engineers

Table 1	Sample number	Per cent	
		1968	1966
All engineers	**18 497**		
Engineers stating age	**18 444**	*100·0*	*100·0*
Under 25	732	*4·0*	*2·9*
25 — 29	2 762	*15·0*	*15·1*
30 — 34	3 202	*17·4*	*16·5*
35 — 39	2 789	*15·1*	*17·1*
40 — 44	3 197	*17·3*	*17·8*
45 — 49	2 375	*12·9*	*10·1*
50 — 54	1 306	*7·1*	*8·0*
55 — 59	1 134	*6·1*	*6·4*
60 — 64	715	*3·9*	*4·7*
65 — 69	189	*1·0*	*1·1*
70 & over	43	*0·2*	*0·2*



■ University graduates

Engineers fall into three approximately equal groups: about a third were aged under 35, a third were between 35 and 44, and the remaining third were 45 or over. This is almost exactly the distribution found in the 1966 survey.

A feature of the age distribution in the 1966 survey was the 'bulge' which extended to the age group 40 to 44: thereafter, numbers fell away rapidly. In 1968, this 'bulge' had extended into the 45 to 49 age group.

The proportion of those under 25 increased in 1968, but figures for this age group underestimate the new entry, since some university graduates do not join an institution for some time after taking a degree. The 1966 Census, for instance, suggests that the percentage age of qualified engineers under 25 was about 6·8.

There have been changes since 1966 in the three age groups from 30 to 44, with an increase in the percentage age 30 to 34, a drop at ages 35 to 39, and a small decrease at ages 40 to 44. A number of factors have combined to produce these changes, including the post-war university expansion, increased enrolment of members of institutions before the qualifications for membership were changed, and emigration among younger engineers.

The proportion of engineers who are university graduates increased from 1966 to 1968, from 33·8 per cent to 36·2 per cent. There are more graduates among the younger than among the older engineers: 43·6 per cent of engineers under 35 were graduates, compared with 31·9 per cent of those aged 35 and over.

●See also Tables 8, 10, 15-19 and 20-26; Question 2.

●Due to rounding off, the percentages in the tables in this survey do not total 100%.

Employers

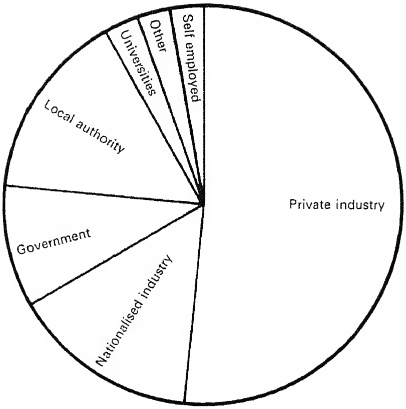


Table 2	Sample number	Per cent 1968	Per cent 1966
All engineers	**18 497**		
Engineers stating employer	**18 407**	*100·0*	*100·0*
Self-employed	541	*2·9*	*2·7*
Employed by—			
Industrial or commercial firms	8 523	*46·3*	*53·4*
Consultant	1 029	*5·6*	
Nationalized industry	2 802	*15·2*	*15·1*
Central Government	1 112	*6·0*	*6·1*
The Armed Forces	379	*2·1*	*2·2*
The UK Atomic Energy Authority	310	*1·7*	*1·7*
Local authority	2 779	*15·1*	*14·2*
University	474	*2·6*	*2·4*
Other employers	458	*2·5*	*2·2*

More than half the engineers were employed by industrial or commercial firms or by consultants. The percentage in 1968 is, however, slightly lower than in 1966 (and there is a parallel reduction in the percentage whose field of work is manufacturing industry (page 8). The next largest employers were the nationalized industries and local government, both with 15 per cent of engineers.

About 70 per cent of all professional engineers are employed by public or private industry and commerce.

Table 15 shows wide variations in the age distributions of engineers for different employers. Firms of consultants and industrial and commercial companies had a marked preponderance of young engineers, 54 per cent of those employed by consultants and 42 per cent of those employed in industry and commerce being under 35. Universities are somewhat below this, with 39 per cent of their engineers under 35. In contrast, Central Government has a proportion of engineers under 35 of only 16 per cent. This is particularly significant since in this area corporate membership of a professional institution is normally a condition for permanent employment.

●See also Tables 15 and 21; Question 7.

Type of work

The distribution of engineers by type of work is shown in the chart below, with shaded areas representing those in administrative or managerial positions. In total, 62 per cent of engineers were in these positions, compared with 55 per cent in 1966, and this increase was general over all types of work. Table 7 shows a parallel increase in engineers' responsibilities, and shows also that it had occurred notably among the younger engineers.

More than a quarter of engineers were in general technical administration, and nearly a third were in research and development and design. There is little change between 1966 and 1968 in the proportions in the various types of work although the last item, 'not engineering work', had more than doubled since 1966. A large proportion of these also answered, in Question 9, that they were in administrative or managerial positions, which suggests that most of the increase is likely to be due to transfers to non-engineering management rather than to engineers embarking on new careers outside the profession.

Table 17 shows the age distribution. Instrumentation and control, design, and research and development all had a marked preponderance of younger engineers, and construction and installation showed the same trend but to a lesser extent. The opposite trend, with a preponderance of older engineers, was shown in consultancy, commercial work, and general technical administration (where it was particularly strongly marked). Those not in engineering occupations showed the same general pattern, but with a very high proportion of engineers in the age group 50 to 59.

Tables 18 and 19 give the age distribution of those in and of those not in administrative or managerial positions. The proportions of those in such positions increase steadily with age from 31 per cent of those aged under 30 to 79 per cent of those aged 50 to 59. Thereafter, however, the proportion drops: 74 per cent of those aged 60 and over were in managerial positions.

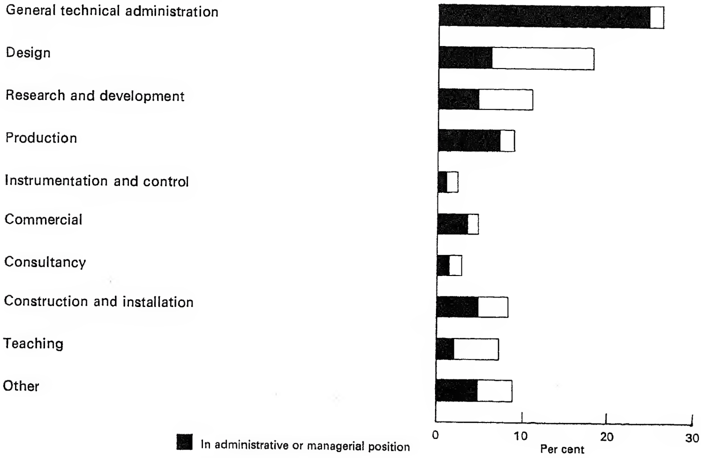


Table 3	Sample number	Per cent 1968	Per cent 1966	In managerial positions	In other positions
All engineers	**18 497**	%	%	**11 394**	**7 103**
Engineers stating type of work	**18 351**	*100·0*	*100·0*	**11 322**	**7 029**
General technical administration	4 850	*26·4*	*26·7*	4 564	286
Design	3 378	*18·4*	*18·1*	1 147	2 231
Research and development	2 089	*11·4*	*12·5*	861	1 228
Production	1 677	*9·1*	*9·4*	1 341	336
Instrumentation and control	443	*2·4*	*2·3*	202	241
Commercial	926	*5·0*	*5·6*	694	232
Consultancy	544	*3·0*	*3·1*	295	249
Construction and installation	1 513	*8·2*	*8·4*	942	571
Teaching	1 379	*7·5*	*7·1*	381	998
Other engineering work	801	*4·4*	*5·1*	369	432
Not engineering work	751	*4·1*	*1·7*	526	225

●See also Tables 18, 19 and 20; Questions 9 and 10.

Field of work

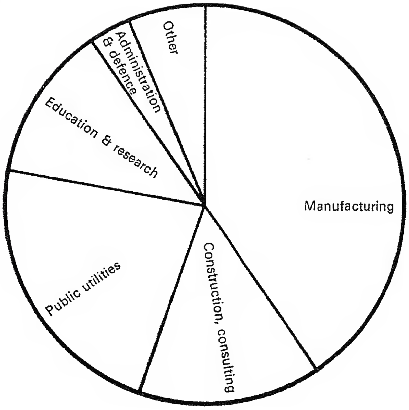


Table 4	Sample number	Per cent 1968	Per cent 1966
All engineers	18 497		
Engineers stating field	18 426	*100·0*	*100·0*
Manufacturing	7 466	*40·5*	*43·3*
Mining and quarrying	387	*2·1*	*2·9*
Gas, electricity and water	1 792	*9·7*	*10·4*
Transport and communications	924	*5·0*	*4·9*
Municipal engineering	1 420	*7·7*	*7·4*
Construction	1 429	*7·8*	*6·2*
Consulting firms	1 288	*7·0*	*6·2*
Research institutions	726	*3·9*	*4·2*
Central Government administration	321	*1·7*	*2·0*
The Armed Forces	322	*1·7*	*1·9*
Education	1 570	*8·5*	*8·0*
Other fields	781	*4·2*	*2·7*

The chart and table on this page show the distribution of engineers under main headings: the chart opposite gives the full distribution.

Manufacturing industry had by far the largest percentage of engineers—40·5 per cent. The next largest had fewer than a quarter of industry's figure—gas, electricity and water with 9·7 per cent.

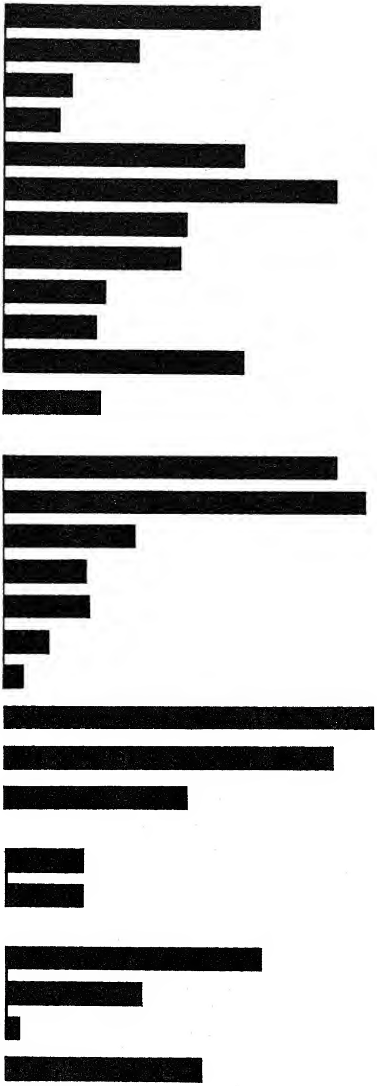
There was a drop, however, in the percentage of engineers in manufacturing industry between 1966 and 1968. The detailed figures opposite show that this drop is notable in electrical machinery and equipment and in aircraft and aero-engines.

Table 20 shows the field of work for engineers in each type of work and makes it possible to examine the fields of work in which the various types are found. Thus manufacturing industry has 58 per cent of all engineers engaged in research and development (just over a third of these are in electronic apparatus manufacture). A further 4 per cent of those engaged in research and development are in universities and technical colleges.

Manufacturing has 42 per cent of design engineers. Public utilities have 25 per cent of them (with municipal engineering taking a large proportion of them—16 per cent). Consulting firms have 16 per cent.

In the educational field, nearly 70 per cent of teachers were in technical or training colleges and nearly 30 per cent in universities. Only 2 per cent were teaching in schools.

PERCENTAGE of all engineers who stated field of work



	1968	*1966*
Manufacturing		
Chemical or allied	5·5	*6·0*
Industrial plant and steelworks	2·9	*3·2*
Metal manufacture	1·5	*1·8*
Machine tools	1·2	*1·2*
Other mechanical engineering	5·2	*4·6*
Electronic apparatus	7·1	*6·9*
Electrical machinery and equipment	3·9	*5·1*
Aircraft	3·7	*4·2*
Shipbuilding and marine engineering	2·3	*2·5*
Vehicles	2·0	*2·1*
Other manufacturing	5·2	*5·6*
Mining and quarrying	2·1	*2·9*
Public utilities		
Electricity	7·1	*7·4*
Municipal engineering	7·7	*7·4*
Transport	2·8	*2·7*
Gas	1·7	*1·8*
Postal services, telecommunications	1·8	*1·7*
Water supply	1·0	*1·2*
Docks, harbours, inland waters	0·4	*0·6*
Construction	7·8	*6·2*
Consulting firms	7·0	*6·2*
Research institutions	3·9	*4·2*
Administration, defence		
Central Government administration	1·7	*2·0*
The Armed Forces	1·7	*1·9*
Education		
Technical or training college	5·4	*5·1*
University	2·9	*2·5*
School	0·3	*0·4*
Other fields	4·2	*2·7*

●See also Tables 16, 20 and 21; Question 8.

Distribution of incomes

The chart shows the distribution of incomes in the financial year 1967/68 in £200 steps. The full columns show the income distribution for all engineers and the shaded portions show the distribution for those aged 35 and over. The unshaded portions therefore show to how great an extent the lower range of salaries is affected by the large proportion of younger engineers.

Earnings for all engineers at various levels were as follows:

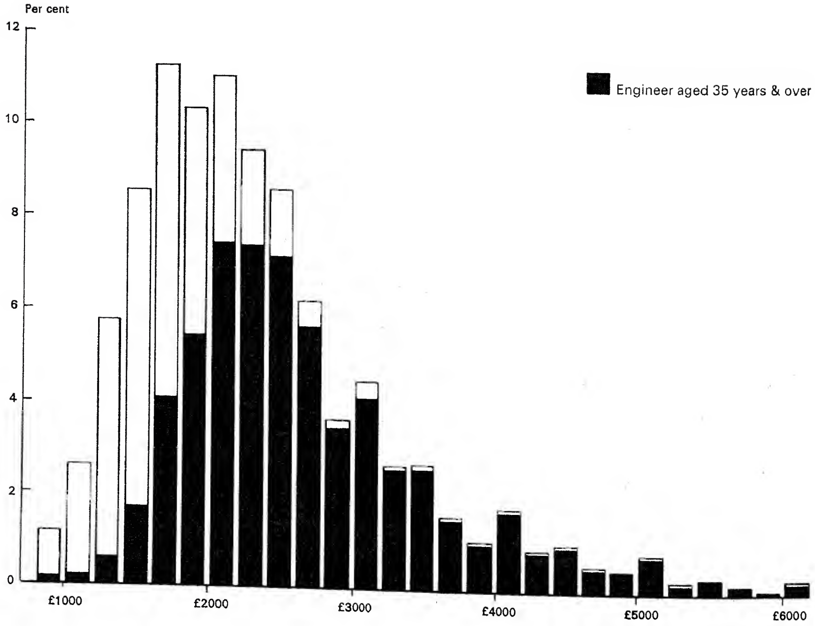
90% earned at least £1410

75% earned at least £1720

50% earned at least £2185

25% earned at least £2790

10% earned at least £3750

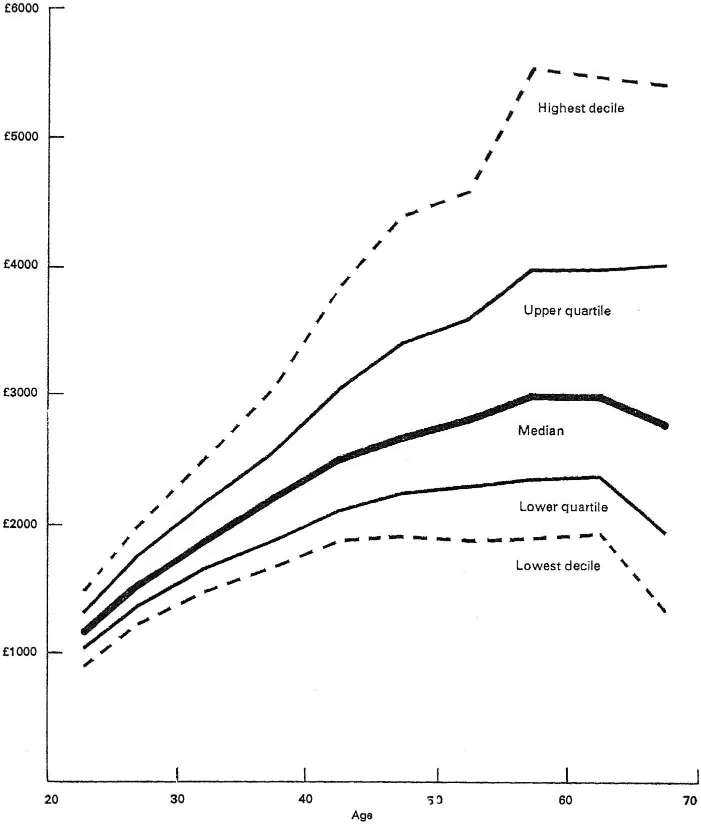


● See also Table 22 and Questions 2 and 12

Distribution of incomes by age

The chart below shows the changes in median, quartile and decile incomes across the age distribution of engineers. Incomes are shown to increase with age—up to a point. In the middle and higher income ranges, this point occurs in the late 50's; but at lower income levels it occurs earlier, with the lines in the chart flattening around the late 40's.

In 1966, no such picture was shown in the middle and higher income ranges, and though some flattening appeared in the lower ranges it was far less marked. It could be inferred that pattern in the distribution of incomes which was beginning to show in 1966 had developed further by 1968.



Incomes comparison 1968 and 1966

The five charts opposite, which compare median, quartile and decile incomes in 1968 with those in 1966, give some indications of what has happened. The increase in incomes at the lower and middle sections of the age distribution have not been matched by corresponding increases at the higher ages, and this is particularly noticeable among the higher incomes, where the 1968 lines fall below those for 1966.

The median income in 1968 for all engineers is 12·1 per cent higher than in 1966. The increases in the three age groups under 35, however, were 13·7, 11·5 and 13·4 per cent, while the increases in each age group from 35 onwards were below 12 per cent. The median income for engineers aged 65 and over increased by only 1·5 per cent between 1966 and 1968.

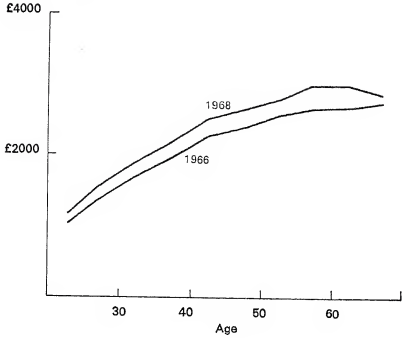
Table 5	**Lowest decile**		**Lower quartile**		**Median**		**Upper quartile**		**Highest decile**	
	1968 £	**1966 £**	**1968 £**	**1966 £**	**1968 £**	**1966 £**	**1968 £**	**1966 £**	**1968 £**	**1966 £**
All ages	**1411**	**1256**	**1722**	**1532**	**2185**	**1949**	**2796**	**2530**	**3748**	**3497**
Under 25	895	842	1020	905	1151	1012	1300	1145	1485	1295
25 — 29	1200	1054	1340	1195	1500	1345	1715	1534	1964	1734
30 — 34	1470	1281	1650	1443	1869	1648	2167	1904	2500	2196
35 — 39	1662	1474	1865	1680	2185	1966	2550	2321	3028	2789
40 — 44	1850	1638	2100	1881	2500	2237	3037	2767	3848	3530
45 — 49	1877	1706	2220	2003	2655	2372	3407	3032	4400	4173
50 — 54	1874	1722	2271	2080	2800	2573	3600	3507	4677	4800
55 — 59	1875	1661	2334	2093	3000	2689	4000	3679	5549	5023
60 — 64	1939	1596	2354	2077	3000	2698	4000	4009	5500	5537
65 — 69	*	*	1978	1918	2775	2760	4038	4388	*	*

*Numbers in these groups are too small to justify calculation of deciles.

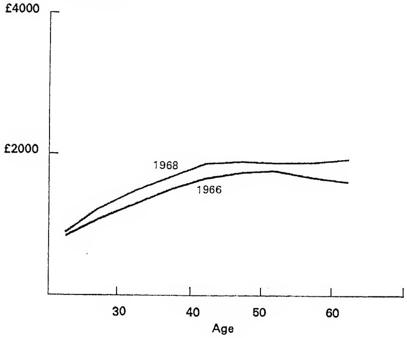
●See also Tables 22, 23 and 24; Question 12.

Incomes: Comparison 1968 and 1966

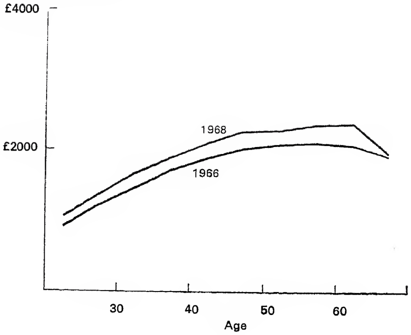
Median



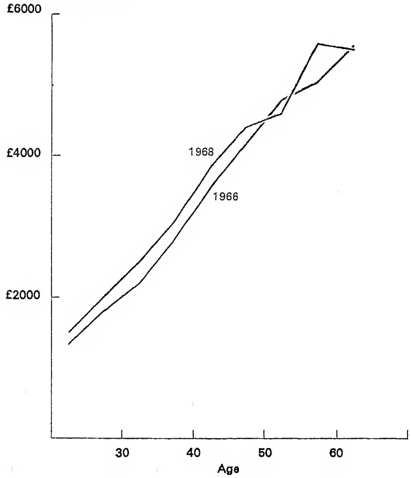
Lowest decile



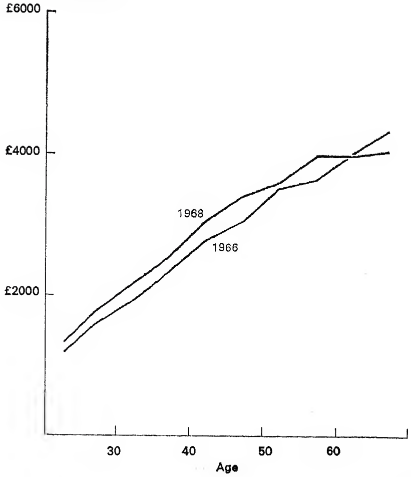
Lower quartile



Highest decile



Upper quartile



Distribution of incomes of graduates and non-graduates

The tables below and the charts opposite show that university graduates have consistently greater incomes than non-graduates. 12 per cent of graduates and 6 per cent of non-graduates have incomes of £4000 and over; while 35 per cent of graduates and 42 per cent of non-graduates had incomes below £2000.

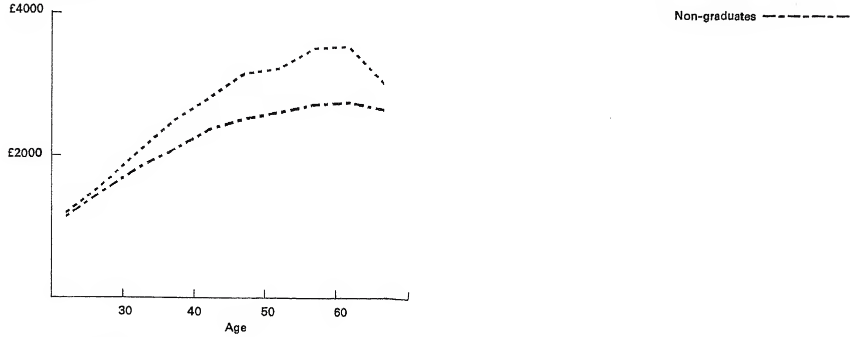
This is the same general position that was found in 1966, but there is a difference between the two years. The difference between the median incomes of graduates and of non-graduates in 1966 was £279; in 1968 this difference was £200. The same tendency is shown by the other measures; the difference in upper quartile incomes was £585 in 1966, £455 in 1968, in lower quartile incomes was £97 in 1966, £48 in 1968, and so on. The levels of incomes of both graduates and non-graduates had increased but the non-graduates have obtained, in general, greater increases than the graduates.

Table 6	Distribution			Cumulative		
	Number	Per cent		Number	Per cent	
		1968	1966		1968	1966
UNIVERSITY GRADUATES						
All engineers	**6 687**					
Engineers stating income	**6 398**	***100·0***	***100·0***			
£6000 and above	214	*3·3*	*3·2*	214	*3·3*	*3·2*
£5000 — £5999	160	*2·5*	*2·6*	374	*5·8*	*5·8*
£4000 — £4999	424	*6·6*	*6·0*	798	*12·4*	*11·8*
£3000 — £3999	1 000	*15·6*	*12·1*	1 798	*28·0*	*23·9*
£2000 — £2999	2 353	*36·8*	*33·0*	4 151	*64·8*	*56·9*
£1000 — £1999	2 153	*33·7*	*40·3*	6 304	*98·5*	*97·2*
Below £1000	94	*1·5*	*2·8*	6 398	*100·0*	*100·0*
NON-GRADUATES						
All engineers	**11 810**					
Engineers stating income	**11 479**	***100·0***	***100·0***			
£6000 and above	178	*1·6*	*1·4*	178	*1·6*	*1·4*
£5000 — £5999	154	*1·3*	*1·1*	332	*2·9*	*2·5*
£4000 — £4999	396	*3·4*	*2·4*	728	*6·3*	*4·9*
£3000 — £3999	1 242	*10·8*	*6·5*	1 970	*17·1*	*11·4*
£2000 — £2999	4 651	*40·6*	*31·0*	6 621	*57·7*	*42·4*
£1000 — £1999	4 751	*41·4*	*55·8*	11 372	*99·1*	*98·2*
Below £1000	107	*0·9*	*1·8*	11 479	*100·0*	*100·0*

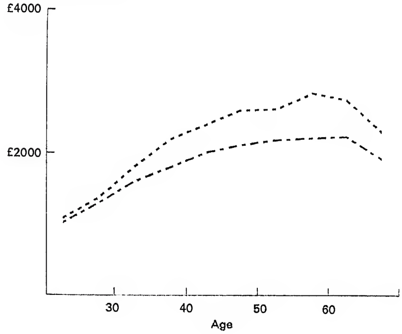
●See also Tables 23 and 24; Questions 5 and 12.

Comparison of university and CNAA graduates and non-graduates

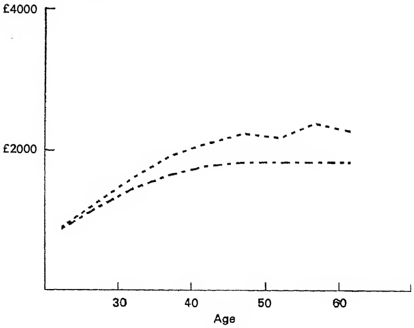
Median



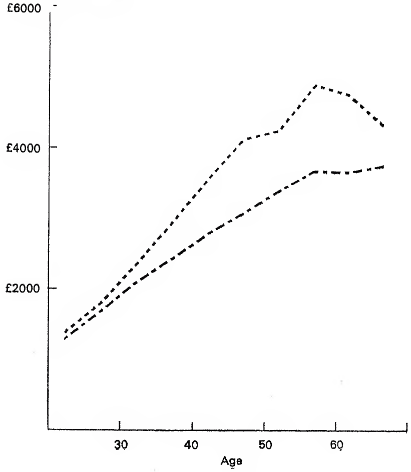
Lower quartile



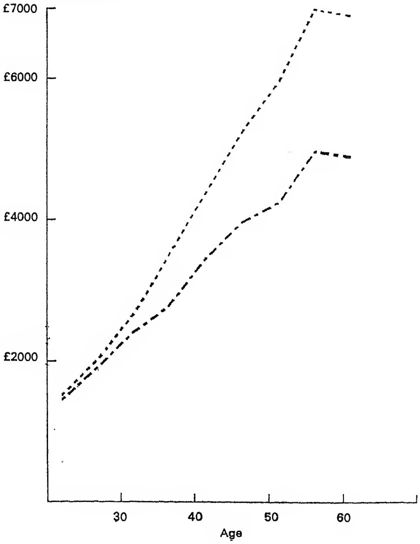
Lowest decile



Upper quartile



Highest decile



Levels of responsibility

The levels of responsibility as defined below are not suitable for teachers, and they are therefore excluded from all results in this section.

Taking levels D and upwards as involving managerial responsibilities, 62·6 per cent of all engineers are involved in management. Comparison with the 1966 results shows a definite trend to higher responsibilities in 1968: there was a smaller percentage of engineers in each of the three lowest grades, and a greater percentage in each of the higher grades. If this comparison is made by separate age groups, the main movement is found in the lower ages: there have been considerable increases in responsibility for engineers below 40 years, a slight increase for those aged 40 to 49, and practically no change among the older engineers.

Guide to levels of engineering responsibility

	Level A	**Level B**	**Level C**
Duties	Preparations of simple plans, designs, calculations, estimating, standards, drawings and other specifications. Routine technical work.	Uses standard engineering techniques for solving problems. Assists more senior engineers with calculations, testing, analysis, design or computation.	Responsible and varied engineering assignments requiring familiarity with a broad field of engineering knowledge. Participates in planning to achieve broad objectives.
Recommendations, decisions, and commitments	Routine decisions with ample precedent or with clearly defined procedures as guidance.	Recommendations limited to solution of problem rather than end results. Decisions normally within established guide lines.	Makes independent studies, analyses, judgments and conclusions. Difficult, complex or unusual matters or decisions are usually referred to a higher authority.
Supervision received	Close supervision. Work reviewed for accuracy and adequacy and for conformity with prescribed procedures.	Detailed oral or written instructions on methods and procedures. Results reviewed and technical guidance available.	Work not usually supervised in detail though technical guidance available on unusual or complex problems.
Leadership, authority and/or supervision exercised	May assign and check work of technicians.	May give technical guidance to junior engineers or technicians on a common project.	May give technical guidance to other engineers or technicians assigned to work on a common project. Not normally having continuous responsibility for other engineers.

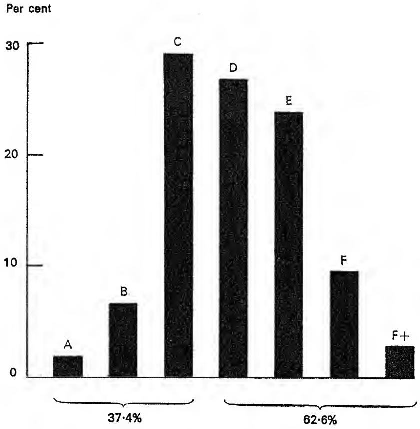


Table 7	**Sample number**	**Per cent 1968**	**Per cent 1966**
All engineers (excluding teachers)	**16 698**	*100·0*	*100·0*
Analysis by level			
A Technical	306	*1·8*	*2·2*
B Engineering	1 087	*6·5*	*6·9*
C Engineering	4 849	*29·0*	*31·3*
D Junior managerial	4 477	*26·8*	*25·8*
E Senior managerial	3 928	*23·5*	*22·3*
F Top managerial	1 591	*9·5*	*8·7*
Beyond F Top managerial	460	*2·8*	*2·7*

●See Tables 25 to 28; Question 15.

Level D	**Level E**	**Level F**
First level of direct and sustained supervision of other professional engineers or full specialization. Application of mature engineering knowledge and conducting projects with scope for independent accomplishment.	Usually requires knowledge of more than one field of engineering. Long and short-term planning of projects. Makes independent decisions on work programme. Exercises ingenuity and originality in devising practical and economical solutions to problems. May supervise large groups of professional and technician staff or a small group of highly specialized professional staff.	Exercises administrative responsibility for several groups on interrelated problems. Senior engineering consultant of recognized standing in his field of engineering. Participates in determining major engineering policy.
Recommendations generally reviewed for soundness of judgment but accepted for technical accuracy and practicability.	Makes responsible decisions not usually subject to technical review except those involving large expenditure or long-term objectives. Takes action to implement assigned projects.	Makes responsible decisions on all matters including large expenditure and/or implementation of major programmes subject only to overall policy and financial control.
Work assigned in terms of objectives, relative priorities and critical areas relevant to other projects.	Work assigned only in terms of broad objectives and is only reviewed for policy, soundness of approach and general effectiveness.	Receives administrative direction based on general policy and objectives. Work reviewed only to ensure conformity with policy and co-ordination with other functions.
Assigns and outlines work. Advises on technical problems, reviews work of others for technical accuracy. May have continuous responsibility for other engineers and technicians.	Co-ordinates work programmes and directs use of equipment and materials. Generally makes recommendations on the selection, discipline and remuneration of staff.	Reviews and evaluates engineering work. Co-ordinates to attain overall programme objectives. As an administrator makes decisions on selection, discipline and remuneration of staff.

With acknowledgments to the Canadian Council of Professional Engineers

Levels of responsibility by age

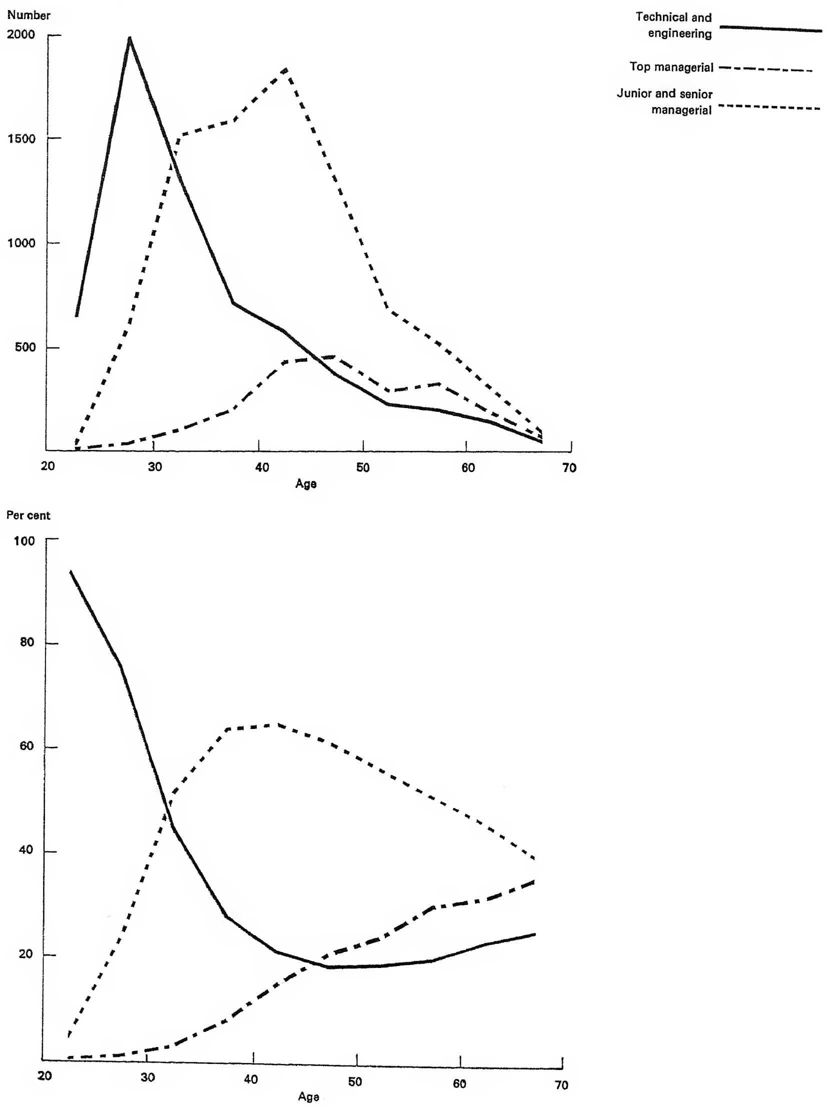


Table 8

	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over
Technical and engineering	655	1 997	1 298	704	579	389	218	199	145	47
Junior and senior managerial	35	607	1 503	1 584	1 811	1 289	675	516	294	74
Top managerial	3	20	100	200	425	437	280	310	199	68

The charts on the opposite page show how levels of responsibility vary with age. The upper chart and the table shows the actual numbers in the sample who ranked themselves within each of the three main groups and, therefore, shows how responsibilities are distributed among engineers.

For age-by-age comparisons, it is necessary to allow for variations in the numbers in each age group, and the second chart does this by showing the percentage of engineers in each age group who were in each of the main groups. Thus, taking the under 25's, the upper chart shows comparatively few in technical and engineering roles; the lower chart shows, however, that this consists of practically the whole of the under 25 group in the survey.

At the other end of the age scale all three lines in the upper chart fall to very small numbers. This is due to the fact that the numbers of engineers in the higher age groups were small. The lower chart allows for this and shows, for example, that from the age of 40 onwards a fairly steady 20 per cent of engineers remain without managerial responsibilities.

Details of the age distribution at each level are given in Tables 25 and 26.

Time at each level of responsibility

The table below shows how long engineers had been at their levels of responsibility. Overall, half of them had spent less than three years there. The proportions were higher still at the lower levels; 60 per cent of those at level A, 75 per cent of those at level B and 57 per cent of those at level C had been there less than three years. The proportions then fell steadily to 31 per cent at level F or beyond.

At the other extreme, 12 per cent of all engineers had been at their level for ten years or longer. On the whole there were smaller percentages in the lower levels (though 15 per cent of those at level A had been there ten years or more) and higher percentages in the top levels. More detail will be found in Tables 27 and 28.

Time at each level of responsibility

Per cent

Table 9	Total	Less than 3 years	3 years and less than 6	6 years and less than 10	10 years and over
All engineers	**100·0**	**50·0**	**23·2**	**14·7**	**12·2**
Analysis by length of time					
A	100·0	59·6	13·3	11·7	15·4
B	100·0	75·4	12·7	5·8	5·9
C	100·0	56·9	21·5	12·4	9·3
D	100·0	49·6	25·0	14·7	10·8
E	100·0	42·8	26·5	17·7	13·0
F	100·0	35·9	23·5	18·5	22·1
Beyond F	100·0	26·1	24·5	23·1	26·4

Unemployment

The question on unemployment had to distinguish between engineers who were unemployed at the time of the survey and those who had been unemployed during the previous twelve months but who were now again employed. The distinction is important because the latter could record completed periods of unemployment, whereas the former, whose unemployment still continued, could say only how long it had lasted so far. The two categories together, however, give the proportion who had been unemployed at some time during the period of twelve months.

Those still unemployed at the time of the survey amounted to 0·4 per cent of all engineers. This figure can be compared with the national unemployment percentage for the whole working population (not only engineers), since that too is based on a count taken at a particular time. At the beginning and at the end of the period over which questionnaires were being received this total percentage was 2·4 per cent.

Those who had been unemployed during the previous twelve months but were back in employment amounted to 1·1 per cent of all engineers. A quarter of them were working again in less than six weeks, and nearly another quarter in 6 to 10 weeks. This, however, left more than half of them out of employment for 11 weeks or more.

Unemployment is not concentrated in any particular age group but is spread fairly evenly over them.

Table 10

	Engineers in sample		Age groups				
	Number	Per cent	Under 30	30-39	40-49	50-59	60 and over
Engineers unemployed at time of survey							
Total	**68**	***100·0***	**9**	**13**	**18**	**15**	**13**
Duration of unemployment (weeks)							
Under 6	14	*20·6*	3	3	6	2	
6 to 10	11	*16·2*	3	2	3	3	
11 to 30	34	*50·0*	3	7	7	7	10
31 to 50	5	*7·4*			1	1	3
51 and over	4	*5·9*		1	1	2	
Engineers unemployed in 1967/68 but re-employed at the time of the survey							
Total	**195***	***100·0***	**49**	**58**	**55**	**24**	**8**
Duration of unemployment (weeks)							
Under 6	49*	*25·1*	11	16	13	4	4
6 to 10	45	*23·1*	5	14	20	5	1
11 to 30	74	*37·9*	27	19	16	10	2
31 to 50	16	*8·2*	3	3	4	5	1
51 and over	11	*5·6*	3	6	2		

* These totals include one engineer who did not state his age.

●See Question 14

Training—engineers taking courses

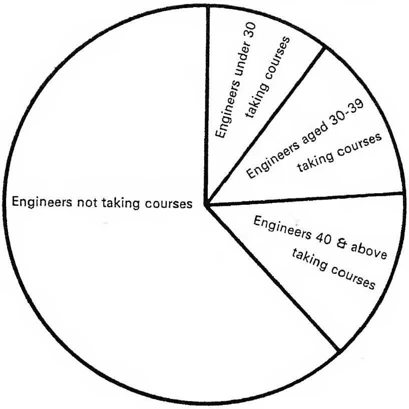


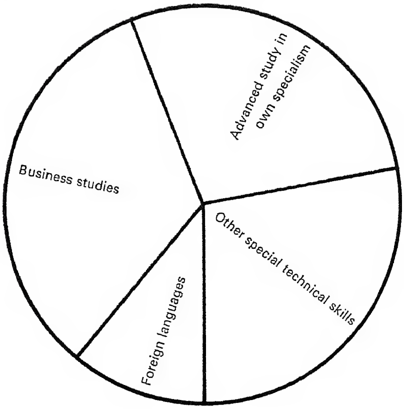
Table 11	Sample number	Engineers taking courses	Engineers taking courses in each age group %
All engineers	**18 497**	**7 061**	*38·2*
Engineers stating age	**18 444**	**7 051**	*38·2*
Under 25	732	458	*62·6*
25 — 29	2 762	1 407	*50·9*
30 — 34	3 202	1 409	*44·0*
35 — 39	2 789	1 135	*40·7*
40 — 44	3 197	1 166	*36·5*
45 — 49	2 375	845	*35·6*
50 — 54	1 306	344	*26·3*
55 — 59	1 134	200	*17·6*
60 and over	947	87	*9·2*

The courses recorded on the questionnaire were taken within the twelve months preceding the survey and were limited to post-experience training. In considering the results, it is necessary to distinguish between numbers of engineers taking courses and the number of courses they took. Many engineers took more than one course, so the number of courses (10 269) is greater than the number of engineers taking them (7 061).

During this period of twelve months, 38 per cent of all engineers took at least one training course. As would be expected, higher proportions of the younger than the older engineers took courses: more than half of those under 30 took courses, and the proportion then drops with age to 9 per cent of those aged over 60.

●See Question 6.

Training—courses taken



Nearly one-third of the courses taken were business studies, including management. These were taken by higher proportions in the older age groups than in the younger ones, but there was still considerable participation even by the youngest engineers: 25 per cent of all courses taken by those under 30 were business studies, compared with 39 per cent of courses taken by those aged 50 and over.

The number of courses concerned with advanced studies in own specialism and with other technical skills were nearly equal, each accounting for 28 per cent of all courses. On the whole, the younger engineers were more involved in these than the older ones: for example, 37 per cent of the courses taken by engineers aged under 30, and 22 per cent taken by those engineers aged 50 and over, were advanced studies in own specialism.

Compared with these, the number of courses in foreign languages were small, accounting for 11 per cent of all courses taken. They were taken predominantly by older engineers.

Table 12	**All courses**		**Advanced study in own specialism**	**Other special technical skills**	**Business studies**	**Foreign languages**
All courses	**10 269**		**2 898**	**2 882**	**3 394**	**1 095**
		%	%	%	%	%
Courses taken by engineers stating age	**10 254**	*100·0*	*28·2*	*28·1*	*33·1*	*10·7*
Under 25	756	*100·0*	*39·2*	*28·4*	*25·8*	*6·6*
25 — 29	2 094	*100·0*	*36·0*	*32·5*	*24·2*	*7·4*
30 — 34	2 032	*100·0*	*29·8*	*27·7*	*33·0*	*9·5*
35 — 39	1 634	*100·0*	*25·4*	*30·3*	*35·3*	*9·1*
40 — 44	1 624	*100·0*	*21·6*	*26·0*	*38·0*	*14·4*
45 — 49	1 206	*100·0*	*22·6*	*25·7*	*39·1*	*12·6*
50 — 54	507	*100·0*	*24·8*	*21·3*	*38·7*	*15·2*
55 — 59	281	*100·0*	*17·8*	*22·1*	*41·3*	*18·9*
60 and over	120	*100·0*	*20·0*	*19·2*	*33·3*	*27·5*

Training—length of courses

Courses in foreign languages were nearly all part-time courses, and they tended to stretch over long periods. Courses in other technical skills split almost equally between full-time and part-time and were mainly comparatively short. The other two classes, advanced studies in own specialism and business studies, involved more full-time than part-time courses, and were mainly comparatively short. In spite of this, however, 24 per cent of the advanced studies and 21 per cent of the business studies courses lasted between nineteen weeks and a full year.

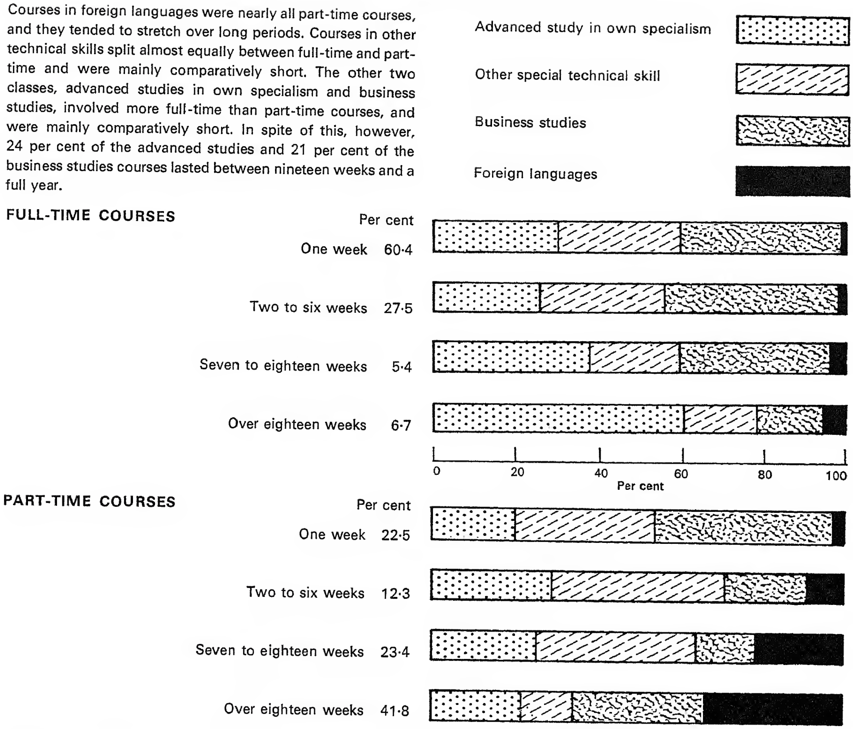


Table 13

	All courses		Advanced study in own specialism	Other special technical skills	Business studies	Foreign languages
		%	%	%	%	%
All courses	**10 269**	*100·0*	*28·2*	*28·1*	*33·1*	*10·7*
Full-time	5 163	*100·0*	*32·3*	*28·5*	*38·3*	*0·9*
1 week	3 117	*100·0*	*31·2*	*29·4*	*39·3*	*0·1*
2 to 6 weeks	1 421	*100·0*	*26·4*	*30·7*	*41·7*	*1·2*
7 to 18 weeks	277	*100·0*	*38·3*	*21·7*	*36·4*	*3·6*
Over 18 weeks	348	*100·0*	*61·5*	*17·0*	*16·4*	*5·2*
Part-time	5 106	*100·0*	*24·1*	*27·6*	*27·8*	*20·5*
1 week	1 147	*100·0*	*20·7*	*35·8*	*42·2*	*1·2*
2 to 6 weeks	629	*100·0*	*29·4*	*42·3*	*19·9*	*8·4*
7 to 18 weeks	1 195	*100·0*	*26·7*	*38·9*	*13·1*	*21·3*
Over 18 weeks	2 135	*100·0*	*22·9*	*12·6*	*30·5*	*34·0*

Incomes of engineers and scientists 1968

The charts and table overleaf have been prepared jointly by the Council of Engineering Institutions and the Council of Science and Technology Institutes to illustrate the similarities and differences between the profiles of professional engineers and scientists.

In 1968 there were parallel surveys of professional engineers and professional scientists.

The constituent members of the Council of Science and Technology Institutes who carried out the parallel survey are:—

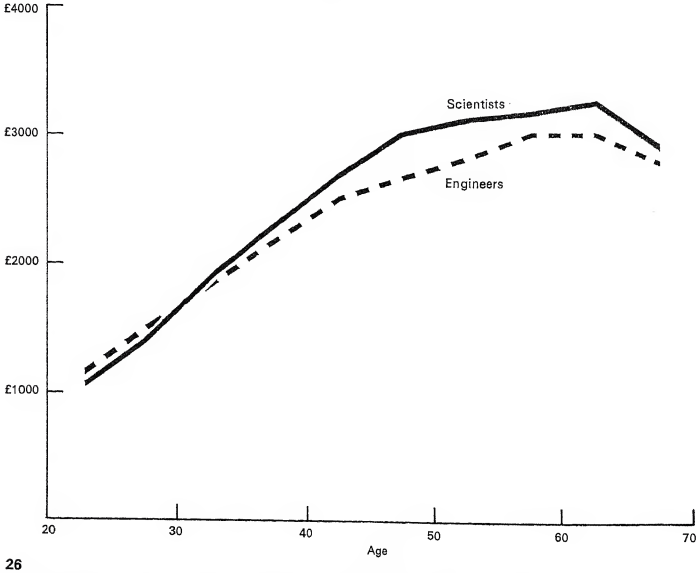
The Institute of Biology
The Royal Institute of Chemistry
The Institute of Mathematics and its Applications
The Institution of Metallurgists
The Institute of Physics and The Physical Society

It had been observed in the 1966 survey of engineers that the university or CNAA graduate earned roughly 15 per cent more than the non-graduate. It follows that, in making a comparison of median incomes, it is important to note that graduates were 71 per cent of the sample of scientists but only 36 per cent of the sample of engineers. This difference largely explains the gap between the age-earning profiles of scientists and engineers shown in the chart below.

It is interesting to see that the upper chart on the opposite page, which compares the median incomes for graduates, shows that age for age there is no significant difference between engineers and scientists for most of the professional career. After age 55, the engineers have the advantage.

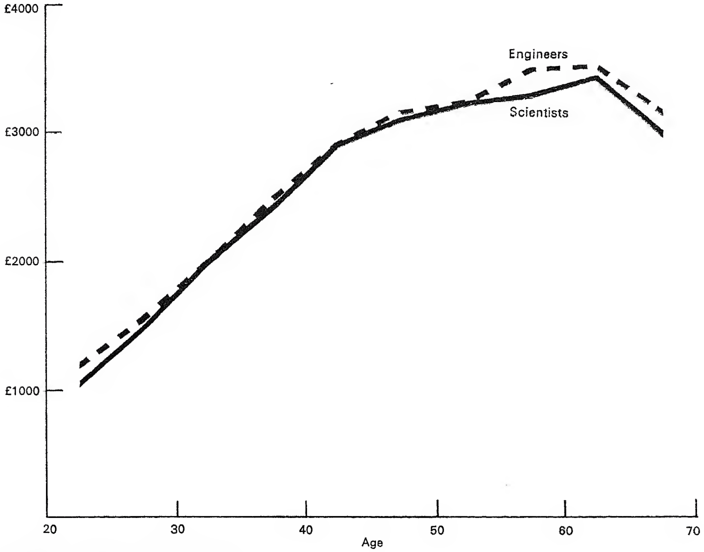
The third chart, on the other hand, shows that the non-graduate engineers have a higher median income than non-graduate scientists. This is explained by historical differences in the method of education and training in the two professional groups. In the past, professional engineers did not require a university degree. Although the position is now changing, the present body of non-graduate engineers has amongst its numbers many senior members of their profession. On the other hand the non-graduate scientists are mainly in supporting roles.

Median incomes of all engineers and scientists in the two surveys

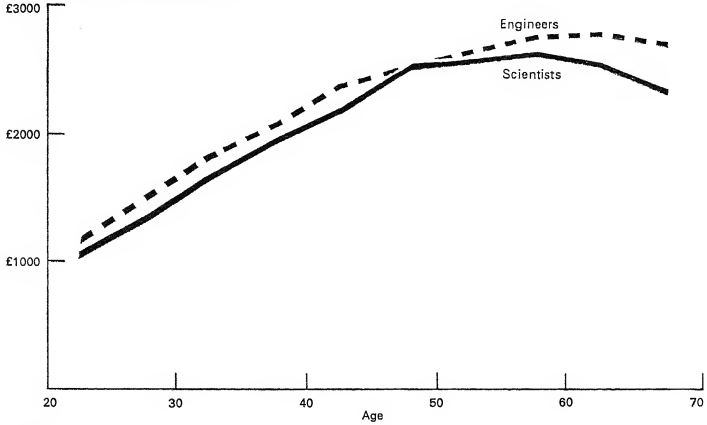


Median incomes of engineers and scientists

With a university or CNAA degree



Without a university or CNAA degree



Median incomes by age

Table 14	Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65 and over
	£	£	£	£	£	£	£	£	£	£
All in sample										
Engineers	1151	1500	1869	2185	2500	2655	2800	3000	3000	2789
Scientists	1050	1400	1875	2295	2662	3000	3107	3176	3255	2905
With a university or CNAA degree										
Engineers	1194	1537	2009	2465	2800	3150	3204	3500	3522	3167
Scientists	1050	1485	2011	2430	2800	3107	3210	3290	3423	3000
Without a university or CNAA degree										
Engineers	1130	1485	1800	2052	2340	2500	2603	2704	2730	2692
Scientists	1057	1320	1640	1913	2132	2500	2537	2613	2500	2300

Part two

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ALL ENGINEERS IN SAMPLE

Analysis by employer and age

Table 15

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ALL ENGINEERS	**18 497**		**732**	**2 762**	**3 202**	**2 789**	**3 197**	**2 375**	**1 306**	**1 134**	**715**	**189**	**43**	**53**
		%	*4·0*	*15·0*	*17·4*	*15·1*	*17·3*	*12·9*	*7·1*	*6·1*	*3·9*	*1·0*	*0·2*	
Self-employed	541	*2·9*	3	19	46	58	105	90	48	44	57	40	21	10
Employed by														
Central Government	1 112	*6·0*	8	59	113	118	207	220	142	155	74	12	1	3
The Armed Forces	379	*2·1*	7	30	66	77	59	74	41	20	4	1	—	—
Local authority, including colleges and schools	2 779	*15·1*	80	364	461	440	518	326	210	207	144	19	—	10
Nationalized industry or public corporation	2 802	*15·2*	99	399	438	409	498	372	251	211	105	15	1	4
The UK Atomic Energy Authority	310	*1·7*	4	18	23	57	87	73	25	11	12	—	—	—
University	474	*2·6*	20	75	91	67	80	70	23	26	13	6	1	2
Industrial or commercial company or private firm	8 523	*46·3*	426	1 504	1 630	1 334	1 405	1 008	484	385	251	72	8	16
Consultant	1 029	*5·6*	72	231	247	153	141	77	42	27	20	12	4	3
Any other employer	458	*2·5*	12	48	74	74	80	60	29	41	22	10	4	4
Employer not stated	**90**		**1**	**15**	**13**	**2**	**17**	**5**	**11**	**7**	**13**	**2**	**3**	**1**

Analysis by field of work and age

Table 16

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ALL ENGINEERS	**18 497**		**732**	**2 762**	**3 202**	**2 789**	**3 197**	**2 375**	**1 306**	**1 134**	**715**	**189**	**43**	**53**
		%	*4·0*	*15·0*	*17·4*	*15·1*	*17·3*	*12·9*	*7·1*	*6·1*	*3·9*	*1·0*	*0·2*	
Manufacturing	7 466	*40·5*	327	1 225	1 455	1 152	1 239	910	450	370	244	64	14	16
Mining and quarrying	387	*2·1*	4	17	52	76	74	70	41	35	13	2	1	2
Construction	1 429	*7·8*	96	301	259	203	218	145	81	66	34	11	7	8
Gas, electricity and water	1 792	*9·7*	58	288	261	260	339	215	141	131	81	13	2	3
Transport and communications	924	*5·0*	32	114	148	128	147	141	96	70	38	9	—	1
Municipal engineering	1 420	*7·7*	61	246	235	211	205	139	111	117	84	8	—	3
Research institution, association or station	726	*3·9*	20	87	86	106	147	146	58	47	24	5	—	—
Education	1 570	*8·5*	32	134	271	265	351	239	107	92	57	13	1	8
Central Government administration	321	*1·7*	1	6	20	26	58	58	51	67	30	4	—	—
The Armed Forces	322	*1·7*	5	30	58	66	50	61	38	11	2	1	—	—
Consulting firms	1 288	*7·0*	74	218	256	194	207	131	59	50	50	34	9	6
Other work	781	*4·2*	17	93	91	101	148	113	64	72	50	21	6	5
Field not stated	**71**		**5**	**3**	**10**	**1**	**14**	**7**	**9**	**6**	**8**	**4**	**3**	**1**

ALL ENGINEERS IN SAMPLE

Analysis by type of work and age

Table 17

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ALL ENGINEERS	**18 497**		**732**	**2 762**	**3 202**	**2 789**	**3 197**	**2 375**	**1 306**	**1 134**	**715**	**189**	**43**	**53**
		%	*4·0*	*15·0*	*17·4*	*15·1*	*17·3*	*12·9*	*7·1*	*6·1*	*3·9*	*1·0*	*0·2*	
General technical administration	4 850	*26·4*	42	298	585	732	984	818	516	485	308	57	9	16
Production	1 677	*9·1*	93	280	365	243	248	208	104	78	42	9	1	6
Instrumentation and control	443	*2·4*	26	105	89	73	65	44	16	14	10	1	—	—
Construction, installation	1 513	*8·2*	86	327	276	207	243	153	89	59	52	14	3	4
Research and development	2 089	*11·4*	134	463	421	284	293	241	101	94	44	9	3	2
Design	3 378	*18·4*	242	793	707	565	466	292	127	101	58	21	2	4
Teaching	1 379	*7·5*	10	102	254	253	323	211	92	71	41	12	2	8
Commercial	926	*5·0*	23	97	136	137	187	140	81	69	39	11	2	4
Consultancy, if not covered in one of the other categories	544	*3·0*	8	53	83	77	104	75	36	33	42	24	9	—
Other engineering occupation	801	*4·4*	35	145	151	125	142	76	50	39	28	7	2	1
Not engineering occupation	751	*4·1*	23	85	116	88	126	97	82	74	36	14	6	4
Type of work not stated	**146**		**10**	**14**	**19**	**5**	**16**	**20**	**12**	**17**	**15**	**10**	**4**	**4**

ENGINEERS IN SAMPLE IN ADMINISTRATIVE OR MANAGERIAL POSITIONS

Analysis by type of work and age

Table 18

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ENGINEERS IN ADMINISTRATIVE OR MANAGERIAL POSITIONS	**11 394**		**150**	**946**	**1 741**	**1 752**	**2 296**	**1 834**	**1 030**	**906**	**556**	**124**	**24**	**35**
		%	*1·3*	*8·3*	*15·3*	*15·4*	*20·2*	*16·1*	*9·1*	*8·0*	*4·9*	*1·1*	*0·2*	
General technical administration	4 564	*40·3*	33	239	538	693	936	787	498	468	294	55	8	15
Production	1 341	*11·8*	35	180	293	204	225	187	98	69	37	7	1	5
Instrumentation and control	202	*1·8*	3	29	47	37	35	31	8	7	4	1	—	—
Construction, installation	942	*8·3*	30	142	164	133	183	129	66	41	39	9	3	3
Research and development	861	*7·6*	8	77	159	133	164	159	69	60	27	5	—	—
Design	1 147	*10·1*	14	118	214	233	235	157	74	58	28	11	2	3
Teaching	381	*3·4*	2	18	49	50	109	78	28	26	16	3	—	2
Commercial	694	*6·1*	10	42	98	101	150	118	68	60	33	8	2	4
Consultancy, if not covered in one of the other categories	295	*2·6*	1	15	36	44	62	51	24	20	27	12	3	—
Other engineering occupation	369	*3·3*	7	44	58	58	88	43	31	24	12	1	2	1
Not engineering occupation	526	*4·6*	7	38	74	62	99	81	64	60	29	8	3	1
Type of work not stated	**72**		**—**	**4**	**11**	**4**	**10**	**13**	**2**	**13**	**10**	**4**	**—**	**1**

ENGINEERS IN SAMPLE IN OTHER POSITIONS

Analysis by type of work and age

Table 19

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ENGINEERS IN OTHER POSITIONS	**7 103**		**582**	**1 816**	**1 461**	**1 037**	**901**	**541**	**276**	**228**	**159**	**65**	**19**	**18**
		%	*8·2*	*25·6*	*20·6*	*14·6*	*12·7*	*7·6*	*3·9*	*3·2*	*2·2*	*0·9*	*0·3*	
General technical administration	286	*4·1*	9	59	47	39	48	31	18	17	14	2	1	1
Production	336	*4·8*	58	100	72	39	23	21	6	9	5	2	—	1
Instrumentation and control	241	*3·4*	23	76	42	36	30	13	8	7	6	—	—	—
Construction, installation	571	*8·1*	56	185	112	74	60	24	23	18	13	5	—	1
Research and development	1 228	*17·5*	126	386	262	151	129	82	32	34	17	4	3	2
Design	2 231	*31·7*	228	675	493	332	231	135	53	43	30	10	—	1
Teaching	998	*14·2*	8	84	205	203	214	133	64	45	25	9	2	6
Commercial	232	*3·3*	13	55	38	36	37	22	13	9	6	3	—	—
Consultancy, if not covered in one of the other categories	249	*3·5*	7	38	47	33	42	24	12	13	15	12	6	—
Other engineering occupation	432	*6·1*	28	101	93	67	54	33	19	15	16	6	—	—
Not engineering occupation	225	*3·2*	16	47	42	26	27	16	18	14	7	6	3	3
Type of work not stated	**74**		**10**	**10**	**8**	**1**	**6**	**7**	**10**	**4**	**5**	**6**	**4**	**3**

Analysis by field of work and type of work

Table 20

	TOTAL		General technical admin.	Produc-tion	Instru-menta-tion and control	Con-struction instal-lation	Research and develop-ment	Design	Teaching	Com-mercial	Consult-ancy	Other engineer-ing	Not engineer-ing	Type of work not stated
ALL ENGINEERS	**18 497**		**4 850**	**1 677**	**443**	**1 513**	**2 089**	**3 378**	**1 379**	**926**	**544**	**801**	**751**	**146**
		%	*26·4*	*9·1*	*2·4*	*8·2*	*11·4*	*18·4*	*7·5*	*5·0*	*3·0*	*4·4*	*4·1*	
Manufacturing														
Total	**7 466**	*40·5*	**1 776**	**1 203**	**253**	**266**	**1 201**	**1 432**	**22**	**623**	**105**	**318**	**225**	**42**
Chemical or allied manufacture	1 021	*5·5*	267	184	56	69	118	179	1	43	13	57	31	3
Metal manufacture	279	*1·5*	87	60	6	10	38	21	1	20	5	12	18	1
Machine tools manufacture	212	*1·2*	59	46	1	2	14	52	—	22	4	7	1	4
Industrial plant or steelwork	538	*2·9*	172	58	10	28	38	124	1	68	6	21	8	4
Other mechanical engineering	957	*5·2*	259	142	12	27	101	218	2	89	18	61	26	2
Electrical machinery or equipment	716	*3·9*	132	107	37	22	96	153	3	119	7	22	14	4
Electronic or telecommunication apparatus	1 306	*7·1*	211	155	74	25	417	216	3	118	11	30	38	8
Shipbuilding or marine engineering	425	*2·3*	146	44	6	40	23	71	3	30	12	35	12	3
Aircraft or aero-engine manufacture	686	*3·7*	119	92	22	7	169	207	3	18	7	15	25	2
Vehicle manufacture	376	*2·0*	86	76	5	6	57	94	3	17	8	14	8	2
Other manufacturing	950	*5·2*	238	239	24	30	130	97	2	79	14	44	44	9
Mining and quarrying	**387**	*2·1*	**112**	**167**	**3**	**7**	**30**	**15**	**—**	**11**	**6**	**23**	**12**	**1**
Construction—building, civil engineering, contracting	**1 429**	*7·8*	**299**	**37**	**10**	**591**	**43**	**328**	**2**	**74**	**11**	**16**	**16**	**2**

Analysis by field of work and type of work

Table 20—continued

	TOTAL		General technical admin.	Production	Instrumentation and control	Construction installation	Research and development	Design	Teaching	Commercial	Consultancy	Other engineering	Not engineering	Type of work not stated
		%												
Public utilities–Total	4 136	*22·4*	1 747	180	104	478	190	851	24	118	33	298	81	32
Gas production or distribution	308	*1·7*	124	70	10	28	14	12	—	28	4	11	6	1
Electricity generating or distribution	1 300	*7·1*	458	81	84	239	64	158	4	59	9	116	24	4
Water supply	184	*1·0*	96	4	2	22	3	48	—	—	1	6	—	2
Transport (by rail, road, air, water)	523	*2·8*	244	19	4	24	34	49	2	28	11	72	30	6
Docks, harbours, inland waterways	71	*0·4*	39	—	—	12	2	7	—	1	—	5	4	1
Municipal engineering	1 420	*7·7*	656	3	—	120	13	555	3	—	4	47	4	15
Postal services, telecommunications or broadcasting	330	*1·8*	130	3	4	33	60	22	15	2	4	41	13	3
Research—research institution, association or station	726	*3·9*	81	13	32	17	446	102	6	—	7	6	14	2
Education–Total	1 570	*8·5*	80	2	7	2	84	13	1 285	—	3	7	78	9
University	528	*2·9*	23	2	6	1	81	11	375	—	2	4	17	6
Technical college or training college	995	*5·4*	57	—	1	1	3	2	882	—	1	3	43	2
School	47	*0·3*	—	—	—	—	—	—	28	—	—	—	18	1
Public administration and defence–Total	643	*3·5*	408	16	7	11	44	19	23	3	9	29	71	3
Central Government administration	321	*1·7*	203	11	5	10	23	16	1	3	5	14	29	1
The Armed Forces	322	*1·7*	205	5	2	1	21	3	22	—	4	15	42	2
Consulting firms	1 288	*7·0*	163	24	16	111	12	555	3	12	330	9	48	5
Other fields	781	*4·2*	173	33	11	28	36	62	12	81	38	94	201	12
Field not stated	71		11	2	—	2	3	1	2	4	2	1	5	38

Analysis by field of work and employer

Table 21

	TOTAL		Self employed	Central Govern-ment	Armed Forces	Local authority	National-ized industry*	UKAEA	University	Industrial or com-mercial company or private firm	Consul-tant	Any other employer	Employer not stated
ALL ENGINEERS	**18 497**		**541**	**1 112**	**379**	**2 779**	**2 802**	**310**	**474**	**8 523**	**1 029**	**458**	**90**
		%	*2·9*	*6·0*	*2·1*	*15·1*	*15·2*	*1·7*	*2·6*	*46·3*	*5·6*	*2·5*	
Manufacturing industry	7 466	*40·5*	139	208	21	8	203	77	5	6 660	21	103	21
Mining and quarrying	387	*2·1*	3	17	—	1	286	2	—	69	2	7	—
Construction	1 429	*7·8*	50	88	—	119	88	12	2	986	46	34	4
Gas, electricity and water	1 792	*9·7*	7	11	—	131	1 482	31	—	103	4	16	7
Transport and communication	924	*5·0*	4	50	8	40	569	—	—	201	1	49	2
Municipal engineering	1 420	*7·7*	—	10	1	1 389	14	—	—	1	—	2	3
Research institution, association or station	726	*3·9*	—	321	12	—	81	162	4	70	1	73	2
Education	1 570	*8·5*	—	21	11	1 036	8	1	461	7	1	21	3
Central Government administration	321	*1·7*	—	308	4	—	5	—	—	—	—	3	1
Armed Forces	322	*1·7*	—	1	319	—	—	—	—	1	—	—	1
Consulting firms	1 288	*7·0*	260	6	—	2	5	4	—	43	950	17	1
Other work	781	*4·2*	75	67	3	49	59	21	1	371	3	129	3
Field not stated	**71**		**3**	**4**	**—**	**4**	**2**	**—**	**1**	**11**	**—**	**4**	**42**

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*Nationalized industry or public corporation including GPO, BBC, NPA, etc.

Analysis by income and age

Table 22

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ALL ENGINEERS	**18 497**		**732**	**2 762**	**3 202**	**2 789**	**3 197**	**2 375**	**1 306**	**1 134**	**715**	**189**	**43**	**53**
		%	*4·0*	*15·0*	*17·4*	*15·1*	*17·3*	*12·9*	*7·1*	*6·1*	*3·9*	*1·0*	*0·2*	
Below £1 000	201	*1·1*	120	52	8	3	3	1	3	3	1	5	2	—
£1 000—1 199	463	*2·6*	225	184	27	6	4	4	6	1	2	2	1	1
£1 200—1 399	1 041	*5·8*	177	618	143	41	21	16	8	8	1	5	2	1
£1 400—1 599	1 537	*8·6*	70	745	402	136	62	41	31	26	17	3	1	3
£1 600—1 799	2 014	*11·2*	16	563	698	339	167	105	51	42	24	6	2	1
£1 800—1 999	1 849	*10·3*	4	254	617	389	269	153	69	53	28	9	1	3
£2 000—2 499	4 355	*24·4*	3	209	910	1 019	987	589	282	206	121	15	2	12
£2 500—2 999	2 649	*14·8*	—	30	232	489	735	566	257	191	123	20	—	6
£3 000—3 999	2 242	*12·5*	—	11	91	243	597	502	321	280	165	19	3	10
£4 000—4 999	820	*4·6*	1	—	10	56	174	193	149	127	89	18	1	2
£5 000—5 999	314	*1·8*	—	—	3	20	61	86	38	61	34	7	2	2
£6 000 and over	392	*2·2*	1	1	—	10	64	88	62	96	53	11	2	4
Income not stated	620		115	95	61	38	53	31	29	40	57	69	24	8
	£		£	£	£	£	£	£	£	£	£	£		
Lowest decile	1 411		895	1 200	1 470	1 662	1 850	1 877	1 874	1 875	1 939	1 311		
Lower quartile	1 722		1 020	1 340	1 650	1 865	2 100	2 220	2 271	2 334	2 354	1 915		
Median	**2 185**		**1 151**	**1 500**	**1 869**	**2 185**	2 500	**2 655**	**2 800**	**3 000**	**3 000**	**2 789**		
Upper quartile	2 796		1 300	1 715	2 167	2 550	3 037	3 407	3 600	4 000	4 000	4 156		
Highest decile	3 748		1 485	1 964	2 500	3 028	3 848	4 400	4 677	5 549	5 500	5 510		

ENGINEERS IN SAMPLE WITH A UNIVERSITY OR CNAA DEGREE

Analysis by income and age

Table 23

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
GRADUATE ENGINEERS	**6 687**		**407**	**1 378**	**1 137**	**850**	**1 145**	**703**	**388**	**350**	**235**	**65**	**16**	**13**
		%	*6·1*	*20·6*	*17·0*	*12·7*	*17·2*	*10·5*	*5·8*	*5·2*	*3·5*	*1·0*	*0·2*	
Below £1 000	94	*1·5*	51	35	3	2	1	—	1	—	—	1	—	—
£1 000—1 199	189	*3·0*	116	60	8	1	1	—	—	—	1	1	1	—
£1 200—1 399	420	*6·6*	101	291	19	3	—	—	2	1	1	—	1	1
£1 400—1 599	483	*7·5*	39	353	63	16	3	2	1	3	1	1	1	—
£1 600—1 799	549	*8·6*	10	285	175	36	20	8	7	2	3	2	—	1
£1 800—1 999	512	*8·0*	2	139	227	53	52	18	13	4	1	2	1	—
£2 000—2 499	1 377	*21·5*	2	121	451	319	257	108	47	35	29	4	1	3
£2 500—2 999	976	*15·3*	—	19	111	213	307	159	77	55	28	7	—	—
£3 000—3 999	1 000	*15·6*	—	8	52	143	309	195	112	104	64	8	1	4
£4 000—4 999	424	*6·6*	1	—	6	35	110	107	62	55	39	9	—	—
£5 000—5 999	160	*2·5*	—	—	1	11	35	44	19	27	20	1	1	1
£6 000 and over	214	*3·3*	1	1	—	3	34	51	37	54	26	6	—	1
Income not stated	289		84	66	21	15	16	11	10	10	22	23	9	2
	£		£	£	£	£	£	£	£	£	£	£		
Lowest decile	1 365		897	1 225	1 600	1 900	2 082	2 221	2 149	2 361	2 256	*		
Lower quartile	1 748		1 056	1 353	1 800	2 181	2 380	2 582	2 600	2 856	2 757	2 125		
Median	**2 300**		**1 194**	**1 537**	**2 009**	**2 465**	**2 800**	**3 150**	**3 204**	**3 500**	**3 522**	**3 167**		
Upper quartile	3 080		1 326	1 750	2 300	2 900	3 500	4 100	4 213	4 873	4 731	4 528		
Highest decile	4 194		1 500	2 000	2 650	3 500	4 400	5 250	5 939	7 000	6 900	*		

*Numbers in these groups are too small to justify calculation of deciles.

ENGINEERS IN SAMPLE WITHOUT A UNIVERSITY OR CNAA DEGREE

Analysis by income and age

Table 24

	TOTAL		Age groups Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	Age not stated
NON-GRADUATE ENGINEERS	**11 810**		**325**	**1 384**	**2 065**	**1 939**	**2 052**	**1 672**	**918**	**784**	**480**	**124**	**27**	**40**
		%	*2·8*	*11·8*	*17·5*	*16·5*	*17·4*	*14·2*	*7·8*	*6·7*	*4·1*	*1·1*	*0·2*	
Below £1 000	107	*0·9*	69	17	5	1	2	1	2	3	1	4	2	—
£1 000—1 199	274	*2·4*	109	124	19	5	3	4	6	1	1	1	—	1
£1 200—1 399	621	*5·4*	76	327	124	38	21	16	6	7	—	5	1	—
£1 400—1 599	1 054	*9·2*	31	392	339	120	59	39	30	23	16	2	—	3
£1 600—1 799	1 465	*12·8*	6	278	523	303	147	97	44	40	21	4	2	—
£1 800—1 999	1 337	*11·6*	2	115	390	336	217	135	56	49	27	7	—	3
£2 000—2 499	2 978	*25·9*	1	88	459	700	730	481	235	171	92	11	1	9
£2 500—2 999	1 673	*14·6*	—	11	121	276	428	407	180	136	95	13	—	6
£3 000—3 999	1 242	*10·8*	—	3	39	100	288	307	209	176	101	11	2	6
£4 000—4 999	396	*3·4*	—	—	4	21	64	86	87	72	50	9	1	2
£5 000—5 999	154	*1·3*	—	—	2	9	26	42	19	34	14	6	1	1
£6 000 and over	178	*1·6*	—	—	—	7	30	37	25	42	27	5	2	3
Income not stated	331		31	29	40	23	37	20	19	30	35	46	15	6
	£		£	£	£	£	£	£	£	£	£	£		
Lowest decile	1 420		895	1 191	1 435	1 611	1 750	1 800	1 800	1 800	1 800	1 267		
Lower quartile	1 700		1 000	1 300	1 600	1 800	2 000	2 106	2 171	2 200	2 222	1 843		
Median	**2 100**		**1 130**	**1 485**	**1 800**	**2 052**	**2 340**	**2 500**	**2 603**	**2 704**	**2 730**	**2 692**		
Upper quartile	2 625		1 258	1 685	2 050	2 400	2 759	3 050	3 350	3 628	3 619	4 150		
Highest decile	3 500		1 457	1 890	2 400	2 779	3 491	3 978	4 259	4 979	4 880	5 714		

ENGINEERS IN SAMPLE WHO STATED LEVEL OF RESPONSIBILITY(1)

Analysis by level and age

Table 25

	TOTAL		Age groups											Age not stated
			Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over	
ENGINEERS WHO STATED LEVEL	**16 698**		**693**	**2 624**	**2 901**	**2 488**	**2 815**	**2 115**	**1 173**	**1 025**	**638**	**159**	**30**	**37**
Analysis by level		*%*	*4·2*	*15·7*	*17·4*	*14·9*	*16·9*	*12·7*	*7·0*	*6·2*	*3·8*	*1·0*	*0·2*	
A	306	*1·8*	82	71	41	19	23	15	17	16	13	6	2	1
B	1 087	*6·5*	294	430	153	59	43	38	28	22	12	6	1	1
C	4 849	*29·0*	279	1 496	1 104	626	513	336	173	161	120	26	6	9
D	4 477	*26·8*	27	479	995	897	880	536	283	214	127	26	6	7
E	3 928	*23·5*	8	128	508	687	931	753	392	302	167	36	6	10
F	1 591	*9·5*	3	17	84	171	334	341	211	239	140	42	4	5
Beyond F	460	*2·8*	—	3	16	29	91	96	69	71	59	17	5	4

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(1)Teachers were not asked to answer this question.

ENGINEERS IN SAMPLE WHO STATED LEVEL OF RESPONSIBILITY

Percentage analysis by level and age

Per cent

Table 26

	TOTAL	Age groups										
		Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70 and over
ENGINEERS WHO STATED LEVEL	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**
Analysis by level												
A	1·8	11·8	2·7	1·4	0·8	0·8	0·7	1·4	1·6	2·0	3·8	6·7
B	6·5	42·4	16·4	5·3	2·4	1·5	1·8	2·4	2·1	1·9	3·8	3·3
C	29·0	40·3	57·0	38·1	25·2	18·2	15·9	14·7	15·7	18·8	16·4	20·0
D	26·8	3·9	18·3	34·3	36·1	31·3	25·3	24·1	20·9	19·9	16·4	20·0
E	23·5	1·2	4·9	17·5	27·6	33·1	35·6	33·4	29·5	26·2	22·6	20·0
F	9·5	0·4	0·6	2·9	6·9	11·9	16·1	18·0	23·3	21·9	26·4	13·3
Beyond F	2·8	—	0·1	0·6	1·2	3·2	4·5	5·9	6·9	9·2	10·7	16·7
ENGINEERS WHO STATED LEVEL	**100·0**	**4·2**	**15·7**	**17·4**	**14·9**	**16·9**	**12·7**	**7·0**	**6·2**	**3·8**	**1·0**	**0·2**
Analysis by age												
A	**100·0**	26·9	23·3	13·4	6·2	7·5	4·9	5·6	5·2	4·3	2·0	0·7
B	**100·0**	27·1	39·6	14·1	5·4	4·0	3·5	2·6	2·0	1·1	0·6	0·1
C	**100·0**	5·8	30·9	22·8	12·9	10·6	6·9	3·6	3·3	2·5	0·5	0·1
D	**100·0**	0·6	10·7	22·3	20·1	19·7	12·0	6·3	4·8	2·8	0·6	0·1
E	**100·0**	0·2	3·3	13·0	17·5	23·8	19·2	10·0	7·7	4·3	0·9	0·2
F	**100·0**	0·2	1·1	5·3	10·8	21·1	21·5	13·3	15·1	8·8	2·6	0·3
Beyond F	**100·0**	—	0·7	3·5	6·4	20·0	21·1	15·1	15·6	12·9	3·7	1·1

ENGINEERS IN SAMPLE WHO STATED LEVEL OF RESPONSIBILITY

Analysis of level of responsibility by length of time at that level

Table 27

	TOTALS		Less than 1 year	1 year and less than 2 years	2 years and less than 3 years	3 years and less than 4 years	4 years and less than 5 years	5 years and less than 6 years	6 years and less than 7 years	7 years and less than 8 years	8 years and less than 9 years	9 years and less than 10 years	10 years and over	Length of time not stated
ALL ENGINEERS[1]	**16 698**		**2 436**	**2 933**	**2 194**	**1 488**	**1 300**	**720**	**514**	**628**	**216**	**872**	**1 846**	**1 551**
Analysis by level		*%*	*16·1*	*19·4*	*14·5*	*9·8*	*8·6*	*4·8*	*3·4*	*4·1*	*1·4*	*5·8*	*12·2*	
A	306	*1·8*	76	61	30	19	10	8	14	6	2	11	43	26
B	1 087	*6·5*	321	290	125	60	45	19	16	13	7	21	58	112
C	4 849	*29·0*	801	1 005	675	422	361	154	123	159	51	209	405	484
D	4 477	*26·8*	629	765	615	434	352	225	131	158	53	254	438	423
E	3 928	*23·5*	429	572	527	386	362	199	145	184	64	237	462	361
F	1 591	*9·5*	148	200	183	139	122	87	57	81	30	106	328	110
Beyond F	460	*2·8*	32	40	39	28	48	28	28	27	9	34	112	35

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[1] Teachers were not asked to answer this question.

ENGINEERS IN SAMPLE WHO STATED LEVEL OF RESPONSIBILITY

Percentage analysis of levels of responsibility by length of time at that level

Per cent

Table 28

	TOTALS	Less than 1 year	1 year and less than 2 years	2 years and less than 3 years	3 years and less than 4 years	4 years and less than 5 years	5 years and less than 6 years	6 years and less than 7 years	7 years and less than 8 years	8 years and less than 9 years	9 years and less than 10 years	10 years and over
ALL ENGINEERS	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**	**100·0**
Analysis by level												
A	1·8	3·1	2·1	1·4	1·3	0·8	1·1	2·7	1·0	0·9	1·3	2·3
B	6·5	13·2	9·9	5·7	4·0	3·5	2·6	3·1	2·1	3·2	2·4	3·1
C	29·0	32·9	34·3	30·8	28·4	27·8	21·4	23·9	25·3	23·6	24·0	21·9
D	26·8	25·8	26·1	28·0	29·2	27·1	31·3	25·5	25·2	24·5	29·1	23·7
E	23·5	17·6	19·5	24·0	25·9	27·8	27·6	28·2	29·3	29·6	27·2	25·0
F	9·5	6·1	6·8	8·3	9·3	9·4	12·1	11·1	12·9	13·9	12·2	17·8
Beyond F	2·8	1·3	1·4	1·8	1·9	3·7	3·9	5·4	4·3	4·2	3·9	6·1
ALL ENGINEERS	**100·0**	**16·1**	**19·4**	**14·5**	**9·8**	**8·6**	**4·8**	**3·4**	**4·1**	**1·4**	**5·8**	**12·2**
Analysis by length of time at level												
A	**100·0**	27·1	21·8	10·7	6·8	3·6	2·9	5·0	2·1	0·7	3·9	15·4
B	**100·0**	32·9	29·7	12·8	6·2	4·6	1·9	1·6	1·3	0·7	2·2	5·9
C	**100·0**	18·4	23·0	15·5	9·7	8·3	3·5	2·8	3·6	1·2	4·8	9·3
D	**100·0**	15·5	18·9	15·2	10·7	8·7	5·6	3·2	3·9	1·3	6·3	10·8
E	**100·0**	12·0	16·0	14·8	10·8	10·1	5·6	4·1	5·2	1·8	6·6	13·0
F	**100·0**	10·0	13·5	12·4	9·4	8·2	5·9	3·8	5·5	2·0	7·2	22·1
Beyond F	**100·0**	7·5	9·4	9·2	6·6	11·3	6·6	6·6	6·4	2·1	8·0	26·4

MEMBERSHIP OF THE ENGINEERING INSTITUTIONS WITHIN THE COUNCIL OF ENGINEERING INSTITUTIONS

End December 1968

Table 29

	Total home and overseas members	Home members		
		Corporate and graduate	Corporate	Graduate
The Royal Aeronautical Society	8 467	6 579	5 568	1 011
The Institution of Chemical Engineers	7 281	5 333	2 970	2 363
The Institution of Civil Engineers	32 426	24 931	18 768	6 163
The Institution of Electrical Engineers	52 115	41 797	23 535	18 262
The Institution of Electronic and Radio Engineers	9 581	8 101	3 787	4 314
The Institution of Gas Engineers	3 440	3 217	3 061	156
The Institute of Marine Engineers	13 439	9 742	8 921	821
The Institution of Mechanical Engineers	63 569	54 355	36 426	17 929
The Institution of Mining and Metallurgy	2 518	883	883	—
The Institution of Mining Engineers	3 819	3 469	3 469	—
The Institution of Municipal Engineers	6 814	6 320	6 320	—
The Royal Institution of Naval Architects	3 947	2 839	2 839	—
The Institution of Production Engineers	14 579	12 306	9 072	3 234
The Institution of Structural Engineers	11 557	8 391	5 848	2 543

How the survey was conducted

For the purposes of the survey, professional engineers are defined as corporate members or graduate members (or the equivalent of that grade of membership) of the fourteen institutions which form the Council of Engineering Institutions. The sample used in the survey was drawn from these engineers but was confined to the United Kingdom, those members resident abroad being excluded.

The detailed information needed from the survey required a sample of about 25 000. Its distribution among the institutions and between the grades of membership was in proportion to membership and grade numbers.

Envelopes for use in the survey were addressed by the institutions from their lists, using the formula 'Start at the Xth name and then take every seventh name thereafter throughout the list of home corporate and graduate (or equivalent grade) members.' The starting point, X, for each institution was taken from a list of random numbers. This gave 25 835 names and addresses.

Questionnaires were despatched on 4 and 5 November 1968, and the survey was closed on 18 April 1969. By then, some 21 000 replies had been received.

Not all of these could be used. Rejections included retired engineers, those from overseas who either used a home address or who had gone overseas since the envelopes were addressed, students and trainees, and so on. Questionnaires from semi-retired engineers were retained but their incomes were excluded. This left 18 497 questionnaires in analysis.

The response rate was 79·8 per cent.

The number who did not complete questionnaires was 4654.

Detail from the questionnaire

SURVEY OF PROFESSIONAL ENGINEERS

FOREWORD by the Chairman of the Council of Engineering Institutions, Sir Leonard Drucquer, C.Eng.

In 1966 was carried out the first comprehensive survey of the engineering profession. The first results were published in September 1967 and provided more information than exists on any other profession in the country. It pointed to possible trends in employment with implications for the wellbeing of the individual, industry and the country. One survey is not, however, enough to confirm the existence of trends and it has been decided that a further such survey must be carried out in 1968.

In the last Survey, the response from engineers was outstanding and I hope that for this survey there will be similar support from the profession. Every single reply to this questionnaire is important; the reliability of the results depends upon the proportion of completed questionnaires returned. Please co-operate by answering the questions and returning your completed questionnaire as soon as possible in the envelope provided.

We have taken precautions to preserve anonymity and the identity of respondents will not be disclosed in any circumstances.

This questionnaire is being sent to a sample of the members of the professional engineering institutions. If you are a member of more than one of these Institutions you may receive more than one copy of this questionnaire. Should that happen, please complete one of them, mark the other (or others) 'Duplicate', and return them together in one of the envelopes provided.

ANONYMITY

A note by the Consultant in charge of the Survey

In order to send out reminders to those who have not returned their questionnaires, I must be able to identify those who reply. This is the purpose of the serial numbers on the front of the questionnaires. I must make sure that this number is used only in removing from the reminder file the names of those who have replied, and that it is not used to connect answers (particularly the one concerning income) with the individual who supplied them.

The only occasion when a questionnaire and the name of the person who completed it could come together is when the name is being removed from the reminder file. I must prevent this from happening, so the reminder file will be kept in another building to which the members of my staff who handle questionnaires will not have access. Numbers on returned questionnaires will be listed and the list will be sent to the people who work on the reminder file in the other building. Thus those who see the questionnaires will never see names and addresses, and those who do see names and addresses will never handle questionnaires.

Once the reminders have been posted, all records of names and addresses will be destroyed. It will then be impossible for anyone to discover who completed a questionnaire.

These precautions seem adequate to me, but if you are not convinced, then by cutting from the front page of the questionnaire the corner with the number on it, you will remove the only means by which you can be identified. But if you do this your name will, of course, remain in the reminder file, and you must not be annoyed with me when you receive reminders.

CHRISTOPHER SCARBOROUGH

PART I GENERAL

1. Please indicate by ringing the appropriate number or numbers below whether you are a Member (or equivalent), an Associate Member (or equivalent) or a Graduate Member (or equivalent) of any of the Institutions listed.

	Member	*Associate Member*	*Graduate Member*
The Royal Aeronautical Society	1A	2A	3A
The Institution of Chemical Engineers	1B	2B	3B
The Institution of Civil Engineers	1C	2C	3C
The Institution of Electrical Engineers	1D	2D	3D
The Institution of Electronic and Radio Engineers	1E	2E	3E
The Institution of Gas Engineers	1F	2F	3F
The Institute of Marine Engineers	1G	2G	3G
The Institution of Mechanical Engineers	1H	2H	3H
The Institution of Mining and Metallurgy	1J	2J	
The Institution of Mining Engineers	1K	2K	
The Institution of Municipal Engineers	1L	2L	
The Royal Institution of Naval Architects	1M	2M	
The Institution of Production Engineers	1N	2N	3N
The Institution of Structural Engineers	1P	2P	3P

2. Please underline the year in which you were born in the table below.

1944 or later	1943	1938	1933	1928	1923	1918	1913	1908	1903	1898 or earlier
	1942	1937	1932	1927	1922	1917	1912	1907	1902	
	1941	1936	1931	1926	1921	1916	1911	1906	1901	
	1940	1935	1930	1925	1920	1915	1910	1905	1900	
	1939	1934	1929	1924	1919	1914	1909	1904	1899	
A	B	C	D	E	F	G	H	J	K	L

☐

The 'financial year' referred to in the two questions which follow is the year ended on 5 April 1968.

3. If you were retired or partially retired during the financial year 1967/68 please ring the appropriate number below, and return this questionnaire in the envelope provided.

Retired 1

Partially retired 2

4. If you were working outside the United Kingdom (see note below) during all or part of the financial year 1967/68, (other than attending conferences or paying visits in connection with your work), please ring the number 1 below, and write in how much time you spent abroad during the year.

Worked abroad 1

Time abroad during year ....

'Working outside the United Kingdom' means being in more or less regular employment or in practice during the year in another country. If you were employed by a firm in the U.K. but were working overseas, this question will apply to you if you were paid an overseas salary; but it will not apply if you remained on your U.K. salary with or without special expense allowances.

The United Kingdom is England, Scotland, Wales and Northern Ireland, but not the Irish Republic.

PART II QUALIFICATIONS AND TRAINING

5. Please list below your professional qualifications with major branches or subjects (certificates, diplomas, degrees, etc.). If you have an honours degree, please enter the class you obtained in the column headed 'Class'.

Qualification	Main subject	Class	Where obtained

6. This question is concerned with post-experience training—with any training courses you may have taken *during the last twelve months.* If a course overlapped the beginning or the end of the period of the last twelve months, please give its full length and not merely the portion of it that fell within the period.

Courses may have been taken within your own company or outside it, and may have been full-time or part-time.

Please tick at the appropriate points below for any such courses you have taken in the last twelve months.

If you have taken two or more courses that fit into the same category below, please write the number of them instead of putting a tick. Thus if you took, say, an 8-week part-time course in Spanish and also a 10-week part-time course in German, you would write 'Two' on the line for 7-10 weeks part-time in the column headed Foreign Languages.

		Advanced study in own specialism	Other special technical skills (e.g. computers)	Foreign languages	Business studies (including management)
Year course	full-time ..	 4	.... D	.... M	 V
	part-time ..	 8	.... H	.... R	.... Z
7-10 weeks	full-time ..	 3	 C	 L	.... U
	part-time ..	 7	.... G	.... Q	.... Y
2-6 weeks	full-time ..	 2	.... B	.... K	.... T
	part-time ..	 6	.... F	.... P	 X
One week	full-time ..	 1	.... A	.... J	.... S
	part-time ..	 5	.... E	.... N	.... W

Part III EMPLOYMENT

The questions in this Part have two sets of code letters or numbers side by side. The first set is for answers concerning your present main employment: *please ring only one Main letter.* The second set is for any secondary occupation or occupations you may have (for example lecturing).

	Main	*Secondary*
7. If you are self-employed, please ring the letter A here	A	1A
If you are a salaried employee, please indicate by ringing the appropriate letter the category into which your employer falls		
Central Government (other than the Armed Forces and the GPO)	B	2B
The Armed Forces	C	3C
Local Authority, (this includes technical or training colleges, polytechnics and schools which are under a Local Authority)	D	4D
Nationalized industry (but not UKAEA), the GPO or public corporation (for example, BBC, NPA etc.)	E	5E
The UK Atomic Energy Authority	F	6F
University or college of advanced technology	G	7G
Industrial or commercial company, or private firm	H	8H
A firm of consultants	K	9K
Any other employer (please specify)	L	10L

....

The next question deals with WHERE you are now working—with your FIELD OF WORK.

The list provided has been worked out with care, but also with the realization that in a profession as varied as engineering no list can be entirely satisfactory. The appropriate classification for some engineers may not be easy to decide, but the examples given here may help.

If you cannot find an exact fit for your field of work, please choose the one that comes nearest to it and ring the corresponding number or letter, but *please do not ring more than one number or letter in the Main column.*

Examples

An engineer concerned with instrumentation and control in, say, a chemical plant should ring 2—'In chemical or allied manufacture'.

A Borough Engineer or County Surveyor etc. should ring K—'In municipal engineering'.

A ship's engineer should ring H—'In transport (by rail, road, air, water)'.

An engineer in the research laboratory of, say, an aero-engine factory should ring A—'In aircraft or aero-engine manufacture', not N. But a Civil Service engineer working in a Government research Institution or Station should ring N—'In a research institution, association or station', and not S—'In Central Government administration'.

A consultant or a partner in a firm of consultants or an engineer employed by a consultant should ring M—'In a consulting firm' even though his actual work now is in the factory etc. of a client.

An engineer employed by, say, a firm of civil engineers or a contractor, and now engaged in contract work for, say, a Gas Board should ring D—'In construction (building, civil engineering, contracting)' and not E—'In gas production or distribution'.

8. Please ring the appropriate number or letter below for where you are working now.

Please do not ring more than one Main classification—the one which best fits your work.

	Main	*Secondary*
In mining or quarrying	1	1
In chemical or allied manufacture	2	2
In metal manufacture	3	3
In machine tools manufacture	4	4
In industrial plant or steelwork manufacture	5	5
In other mechanical engineering	6	6
In electrical machinery or equipment manufacture	7	7
In electronic or telecommunications apparatus manufacture	8	8
In shipbuilding or marine engineering	9	9
In aircraft or aero-engine manufacture	A	A
In vehicle manufacture	B	B
In other manufacturing industry	C	C
In construction (building, civil engineering, contracting)	D	D
In gas production or distribution	E	E
In electricity generating or distribution	F	F
In water supply	G	G
In transport (by rail, road, air, water)	H	H
In docks, harbours, inland waterways	J	J
In municipal engineering	K	K
In postal services, telecommunications or broadcasting	L	L
In a consulting firm	M	M
In a research institution, association or station	N	N
In a university or college of advanced technology	P	P
In a technical college or training college	Q	Q
In a school	R	R
In Central Government *administration*	S	S
In the Armed Forces	T	T
Other work (please specify)	U	U

....

The next two questions, 9 and 10, are concerned with the TYPE OF WORK in which you are engaged, and provision is made for recording both main and secondary occupations. If more than one of the classifications given fits your main work, *please ring only one of them*—the one which is most important in your work.

9. If you hold an administrative or managerial position *because* you are an engineer, you will fall into category *a* below; but if you hold it *not because* you are an engineer, you will fall into category *b*. Please ring the appropriate number.

	Main	*Secondary*
a. Administrative or managerial position *as an engineer*	1	1
b. Administrative or managerial position *not as an engineer*	2	2
c. Not in administrative or managerial position	3	3

10. Please ring the letters below corresponding to the type of work in which you are engaged in your main occupation and in any secondary occupation or occupations. If, for your main occupation, more than one type of work is appropriate, *please ring only one letter*—the one which is the most important.

	Main	*Secondary*
General technical administration	A	A
Production	B	B
Instrumentation and control	C	C
Construction, installation	D	D
Research and development (but not if part of a teaching appointment)	E	E
Design	F	F
Teaching	G	G
If your teaching involves research as well, please state the percentage of your time spent on research..%	H	H
Commercial	J	J
Consultancy not covered in one of the categories above	K	K
Other engineering	L	L
Not engineering occupation, unless covered by *b* above (please specify)	M	M

....

The last category (Not engineering occupation) is for any occupation outside the engineering profession—for example, teaching non-engineering subjects.

11. Do not answer this question if you are in an educational institution, in central or local government, or in the Armed Forces.

Please indicate by ringing the appropriate number below, the number of employees (including the partners or directors of a firm or company) in the 'works', site or other place of work in which you are employed now.

9 or fewer	1
10 to 49	2
50 to 99	3
100 to 199	4
200 to 499	5
500 to 999	6
1000 to 1999	7
2000 or more	8

PART IV INCOME

12. Please enter here your gross earned income for the financial year 1967/68 (see note below for the figure which is required).

Income from main occupation .. .. £....................

Income from secondary occupation (if any) .. .. £....................

The income required here is your gross income as returned for Income Tax for the year 1967/68 but excluding any unearned income and wife's income.

FOR SALARIED EMPLOYEES it is the total amount paid to you by your employer (or employers if you have a secondary engineering occupation as well as your main one). This income is shown on the tax form P60 which your employer will have given to you or will give you if you ask for it.

FOR SELF-EMPLOYED ENGINEERS it is your income for the financial year 1967/68 less expenses etc. allowed for Income Tax, but before the deduction of personal or capital or other allowances. Please note that it is not the amount on which you paid tax in 1967/68, which is your income for the previous year.

If your financial year ends at a date other than April 5, please give your income for your own financial year which ended at a date between 6 April 1967 and 5 April 1968.

13. If you were not working continuously throughout the financial year 1967/68 (for example, because of illness or unemployment) to an extent that seriously affected your income for the year, please ring the number 1 below.

Income seriously affected 1

14. If you are at present out of a post (except in the circumstances mentioned below) please state below how many weeks your unemployment has lasted

....weeks ☐☐

If you are not now out of a post but were unemployed during the year 1967/68, please state how long your unemployment lasted

....weeks ☐☐

Please do not include in your answer—

Any period you may have spent between qualifying and taking up your first post, or
any period you may have spent before taking up a post already arranged before you left your previous employment.

PART V LEVELS OF RESPONSIBILITY

The previous questions have all been concerned with matters of fact. In this Part we are concerned with a matter of judgment.

The table on page 8* has been drawn up as a guide to six levels of responsibility, and it is intended as a guide, not as a precise definition. A previous survey showed that most engineers will find it not too difficult to fit themselves into one or other of these levels, except for university and other teachers, for whom these levels are not suitable. If, therefore, you are a teacher please leave this question unanswered.

No guide can hope to fit exactly over the wide range of activities of the various kinds of professional engineering, so using the guide is a matter of deciding which level, taken as a whole, is the best fit for you.

You may possibly find yourself fitting different levels for the various divisions of the table. It is then a matter of judgment to decide which level comes nearest to fitting your work as a whole.

It is obviously important that you should read the descriptions of all the levels before making your decision.

15. When you have decided, please ring the appropriate number below

Level A	1
Level B	2
Level C	3
Level D	4
Level E	5
Level F	6
Beyond Level F	7

Please enter below how long you have been at this level of responsibility ☐☐

....

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*The guide to the seven levels of responsibility is shown on pages 16 and 17 of this Report.

PART VI AREAS OF TECHNOLOGY AND SCIENCE

16. This question is concerned with the area of technology or science within which your post is found, and it recognizes that the technology of your group may be wider than that of your own post. Thus if your post is concerned with 'telemetry' within the group working on 'guided weapons', please put the code letters for guided weapons (AE) in Box 1 and for telemetry (GJ) in Box 2: a list of technologies with codes is set out below and overleaf. If your job technology and your group technology are the same, please put the same code number in both boxes.

Please enter in the boxes on the right the code letters from the list

Technology relevant to the team which you are directing or within which you are working 1 ☐☐

Technology relevant to the job you, yourself, are doing (which may be different from 1).... 2 ☐☐

If in question 10 you ringed M, 'not engineering occupation', please tick in Box 3, here........ 3 ☐

Code	
SA	Acoustics
AA	Aerodynamics
AB	Aeronautics
JE	Aero-engines—gas turbines
JF	Aero-engines—other
MA	Agriculture
JA	Agricultural engineering
AC	Airframes
BA	Air pollution
CA	Airports
SB	Astronomy
SC	Astrophysics
GA	Automation
JB	Automobiles, goods vehicles
AD	Avionics
PA	Biology
BB	Bio-chemical engineering
KA	Bio-engineering
KB	Bio-mechanics
CB	Bridges
EB	Broadcasting and transmitting
MB	Building materials
FA	Cables (electric)
GB	Calibration
MC	Ceramic technology
BC	Chemical engineering
MU	Chemicals and products
QA	Chemistry
EC	Circuits
CC	Civil engineering
MD	Clothing technology
ME	Colour (dyes and pigments)
BD	Combustion
DA	Computers
DB	Computer components

Code	
DC	Computer programs
DD	Computer systems
MF	Concretes
GC	Control systems
JC	Construction equipment
MG	Copying
BE	Corrosion
JD	Cranes
DE	Data systems
DF	Data transmission
CD	Docks, harbours
CE	Drainage
SD	Dynamics
CF	Effluents and industrial waste
FB	Electrical machinery
FD	Electric power generation—hydro-electric
FE	Electric power generation—nuclear
FF	Electric power generation—thermal
FG	Electric power transmission
EA	Electro-acoustics
BF	Electro-chemistry
FC	Electro-mechanical components
EE	Electronic components
ED	Electronics
CG	Erosion
MH	Explosives
MJ	Fires
GD	Fluidics
SE	Fluid mechanics
MK	Food technology
ML	Foundry
BG	Fuels

Code	
CH	Gas distribution
BH	Gas engineering
JG	Gas turbines—industrial and marine
JH	Gears
MM	Glass technology
AE	Guided weapons
JJ	Heating, ventilating, air conditioning
BJ	Heat transfer
CJ	Housing
HA	Hovercraft
HB	Hydrofoils
CK	Irrigation
CL	Land reclamation
SF	Lasers
NH	Laundry
MN	Leather technology
JK	Lifts
FH	Lighting
EF	Line communications
JL	Machine tools
MP	Magnetic materials
SG	Magnetism
HC	Marine engineering
BK	Mass transfer
RA	Mathematics
GE	Measuring instruments
KC	Medical electronics
MQ	Metallurgy
EG	Micro-electronics
EH	Micro-wave
LA	Mining—coal
LB	Mining—gypsum, clay, salt
LC	Mining—metalliferous
CM	Municipal engineering
LD	Natural gas wells
HD	Naval architecture
GF	Navigation aids
EJ	Noise
SH	Nuclear physics
GG	Numerical control
HE	Oceanography
LE	Oil wells
SJ	Optics
MR	Ordnance
MS	Paint technology
MT	Paper technology
MV	Pharmacy
MW	Photography
MX	Plastics
MY	Polymers
JM	Pressure vessels
MZ	Printing
JN	Process plant
JP	Pumps and compressors

Code	
LF	Quarrying
EK	Radar
EL	Radio and television
CN	Railways
JQ	Railway locomotives, rolling stock
BL	Refinery equipment and technology
JR	Refrigeration
JS	Reciprocating engines—diesel
JT	Reciprocating engines—other
CP	Roads, highways
AF	Rockets
NA	Rubber technology
GH	Servo-mechanisms
CQ	Sewerage and sewage disposal
NB	Silicates
NC	Smelting
CR	Soil mechanics or engineering
SK	Solid state
JU	Steam generation
JV	Steam turbine
ND	Steel
CS	Structures and buildings
CT	Surveying, geodesy and mapping
FJ	Switchgear
EM	Telecommunications
GJ	Telemetry
NE	Textiles
EN	Thermionics
SL	Thermodynamics
NF	Timber technology
CU	Traffic engineering
FK	Transformers
FL	Transmission—line
JW	Transmission—mechanical
JX	Tribology
CV	Water supply and purification
JY	Water turbines
NG	Welding

Other (please specify) ....

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AND NOW, PLEASE CHECK BACK THAT YOU HAVE ANSWERED ALL THE QUESTIONS

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